PACKAGING CATALOG

1944

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Encyclopedia of Packaging

Introduction

As the 1944 PACKAGING CATALOG is presented, many new conditions confront the packaging field. War packaging continues unabated, but ahead of us—soon, we hope—is the transition attendant upon reconverting the economic machine and putting it back into gear for peace. Welcome as that day will be, with it will come problems no less difficult than were those of converting for war production. The book is designed to help meet the current conditions as well as those directly ahead.

Today, with not a single exception, the accustomed materials of packaging are under some form of Government control. Those controls, as one important article indicates, will be in force for some time to come: hence, revised and brought up to date is the chart "Packaging Materials Under Government Control," which comprises a handy reference for control order numbers.

When the accustomed materials are again available for general use, they may find their places taken by serviceable substitutes. For both today and tomorrow, the producer of packaged merchandise must become acquainted with all of these many new materials; hence much space in this edition is devoted to such subjects, supported by charts containing information regarding characteristics, physical and chemical properties, test data, and other technical details.

Which of the substitute materials are here to stay of course remains to be seen. Many of the articles present facts that may lead to a conclusion on that subject. One important factor is the desire of the consumer; how to determine that is the burden of at least one discussion. Other discussions deal with methods of applying time-tested standards of package performance.

Packaging for Government orders will continue to be a vital subject for some time. The book contains an entire chapter of wholly new material which will serve as a reliable guide for countless firms engaged in supplying military and Lend-Lease goods. Packaging, it is evident, has assumed a new importance by virtue of its performance in wartime. That new role in many particulars will be a permanent one. Packaging will be utilized protection-wise as well as for building good will in the global distribution which is practically a certainty for this nation's products after the war is over. Many of the current practices described and illustrated in this book will continue to serve then.

One section, entirely new, is devoted to plans for reconversion. In this are discussed prospective changes that may affect packaging—changes in product, consumer attitudes, packaging materials, production machinery, and distribution methods. A well-balanced packaging program involves nearly every department in a business organization; their interrelationship, and the coördination of their activities and interests, will be found adequately dealt with in one of the new articles.

In tune with today's need for scientific and factual information, a great proportion of the articles deal with technical considerations, much of which is presented also in the form of charts and tabulations, some of which have already been referred to. Some of these are new, and those that are repeated from the previous edition have been thoroughly

revised and brought up to date. Very naturally, a certain portion of the text matter treats of subjects which change relatively little from year to year; nevertheless not a sentence was permitted to remain without undergoing the most careful scrutiny to make sure it would be applicable to the new conditions. It is interesting to note, however, that only a relatively small amount of material has been repeated; by far the greater part of the book consists of material especially prepared for the 1944 edition.

Though production of lithographed display material is suffering a temporary lull, the principles involved in merchandising display are still applicable, and some of the best thought in the book is devoted to discussions of merchandising ideas—the time is not far distant when marketing programs will again be built around the package.

Last year's catalog, as we unwillingly admitted, contained very little discussion of package beauty. This year, we are happy to say, it seems more in order to include discussions which look forward to a return of that important aspect of packaging. Perhaps not immediately, but certainly before its life of usefulness is over, the 1944 PACKAGING CATALOG will play a part in helping to develop packages that will at least equal if not surpass in attractiveness those of former years. But with the beauty of the future will come a new utility. Many of the lessons learned from war packaging will be carried over to make civilian packages perform a greater service for the consumer. In concrete and specific fashion these lessons are discussed.

A word must be said about our contributors. The list is longer than ever before. In addition to the signed articles which carry the names of their authors, there is a whole host of individuals and companies who have coöperated in many ways. We have endeavored to extend credit wherever possible, but in an undertaking so extensive and inclusive there may be unavoidable omissions. This expression must be regarded as an attempt to voice our appreciation.

We are justly proud of the part played by the advertisers in PACKAGING CATALOG, not only in the war effort, but in helping the packaging field to plan for the future. In keeping with the character of the book, the advertising is factual and informative. In some cases, for obvious reasons, conditions do not yet permit announcements regarding full details about materials, machinery, services and equipment which their producers will be glad to describe more fully later; nevertheless careful perusal of the advertising matter will repay the effort, for it may lead eventually to an important source of supply.

With a view to affording better and quicker reference and fullest possible information as to sources of supply, the Buyers' Directory has been newly arranged. As now organized, it is divided into four distinct classifications, representing suppliers of materials of packaging, fabricators of various kinds of packages, manufacturers of machinery and equipment, and individuals or firms who perform special services in connection with packaging. Each section is divided into four specific subheads.

More than ever, PACKAGING CATALOG is an encyclopedia. It cannot be static because its subject matter is so wide and so fluid. It collects and presents the best thought and the latest available information about a field that is a cross section of America's industries. With the sincere hope of helping makers and users of packages serve their consumers more efficiently, this book is respectfully submitted.

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planning for reconversion



Tomorrow's products and packages will call for new types of dispensing in retail stores

Product changes affecting packaging

by Clinton K. Royce

Most of us are pretty well agreed that the postwar package will be different—volumes will probably be written between now and V-day about the packages of the future. But let us try at this point to plant both feet squarely on the ground and examine our packaging problems in the cold light of experience since Pearl Harbor.

We should not discuss here the return of packaging materials which can no longer be had, the techniques which the war has temporarily eliminated, save to note that everything we had before the war—in addition to all the improvements a war-pressured ingenuity has developed—will be at our command.

Let us, therefore, concern ourselves with product changes which placed two kinds of problems at our doorstep. One—that of handling product changes brought on by this global war—we have been living with for some time. The other—that of postwar product changes which will affect packaging—we have yet to face.

The first type of problem—largely the packaging for the services of war matériel and the packaging of thousands of *ersatz* products for our civilian economy—although being met head-on, has not been too well handled. True, we were brought face to face with this kind of task without much warning, and certainly without time for careful planning. The amazing thing about all this is our having managed as well as we have. We were at war only days when confusing statements began to come from "high authoritative sources." In fact, you will remember, it got so bad that the President had to appeal by radio to our people to help him stop the rumors. And the packaging industry was not without its share. As conservation measures, ridiculous proposals were made—proposals which when made directives, as many of them were, resulted in chaotic conditions in industry without contributing anything to the successful prosecution of the war.

Gradually, as we began to become thoroughly aware

of the fact that in the Pacific we were at grips with an enemy whose fleet we would very definitely *not* "take care of any Wednesday afternoon," substitute materials appeared in products familiar to our everyday routines. Almost overnight, we were confronted with the task of developing packages designed to protect and merchandise products made from materials never used before in the fabrication of those particular items. Often, too, the products had new contours. Desperately we tried to cope with this packaging problem by applying our peacetime knowledge to an ever-diminishing list of packaging materials.

But what about this postwar problem? Are we going to be caught as we were in 1940? We needn't be if we begin, now, to consider how product changes are going to affect our packaging during the years of adjustment following this war.

Food preservation

Undoubtedly the biggest product change which will affect packaging will come in the field of food preservation. We were just beginning to whet our appetites with problems arising out of the packaging of frozen and dehydrated foods in 1940. Since that time, war has forced us to speed up the development of new methods, new techniques and the application of new materials. I am not yet ready to admit that after the war all our old familiar food packages are going to disappear in favor of so-called "concentrates"—but food packaging generally is in for some sweeping changes.

Wartime necessity has taught us much about the packaging and packing of dehydrated foods. We found that years of normal development were crowded into a few months. Many specialty packaging materials must, and will, be developed to meet the demand for more efficient and economical packages for dehydrated foods. Constant improvements in dehydration processes will be made, making the food products more palatable.

The frozen food field promises just as many problems and just as much opportunity as the dehydrated food industry. Many foods not yet offered in frozen form will appear, and frozen-food packaging will improve.

New product design and materials

The demand for lighter weight, more functional products will also have a far-reaching effect upon postwar packaging. Much planning by industry is already going into the development of many articles for postwar consumption designed to contribute to a "more abundant life."

Our designers are constantly working toward lightness in weight and compactness. The use of new plastics and lightweight metals of high tensile strength is a foregone conclusion. Products which, because of their bulkiness and heavy weight, formerly required complex packaging and packing will, in their new forms, naturally require more simple package constructions. This will be true of a wide variety of consumer products.

War lessons in the treatment of product surfaces subject to corrosion will change many of our prewar packaging concepts. Constantly improving techniques in combating corrosion of packaged products are to be expected.

Changes in merchandising methods

Undoubtedly the ensemble method of merchandising kindred products—products which logically go together—will be expanded. Our leading merchandisers fully realize that net profits can be substantially increased by producing two or more sales potentialities where only one existed formerly. For years we have been conscious of the fact that hinges could be made to produce screw sales, that displays of dentifrices could be made to produce sales of tooth brushes, and that packaged spaghetti and macaroni displays could sell cheese and tomato sauce.

We are certain to be offered a much wider variety of packaged food combinations—and the prepackaging of complete meals, in a variety of menus, is not as remote as some of us think.

Visual display in the package of the future will play an important part. All of our prewar transparent films will be back with us one day, and to this list will be added many new developments. Transparent containers, of course, basically afford visual merchandising with maximum protection to the contents of the package—protection, that is, from contamination. But the merchandising value of the transparent container, and its ability to withstand shock are factors of which today's merchandisers are taking more cognizance.

The field of building-material packaging, when these products again begin to flow to the consumer in unrestricted quantities, is due for many changes. Products in forms which did not permit economical packaging will be offered in new forms which do, largely because their packaging will ease their method of handling.

Sports and play clothing, work clothing, fashion lines—all these will come in for their fair share of postwar packaging and package modernization. Here the element of ensemble merchandising will be a strong one, and the field of package development and improvement will be a big one.

War a factor

Wars have always left a most indelible effect on the lives of the survivors—reflected in their likes and dislikes, and their demands upon production, transportation and merchandising. This war will no doubt be far-reaching in this respect since it is affecting the lives of so many more people than has been the case in other wars. War has a tendency to speed up our lives generally, and this speeding-up tendency will reflect in improved product development, improved distribution methods and improved packaging of the new and changed products. Let us be alert—let us be able to say of packaging that we have profited by our wartime experiences. The changes are coming—let's be ready for them!

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1. River Oaks, Tex., forecasts the conveniently planned, smaller, postwar communities.

Consumer conditions affecting packages

by Arthur P. Hirose

Packages are vehicles to take goods and merchandise to people—to consumers. In so far as human nature is concerned, people may change very little. But war, and other experiences through which people pass, cannot but change consumers and their habits. Where consumers live, their ages, their sex, their environment, their recent experiences, their income, the kinds of homes they live in—all these factors must be taken into consideration by packaging planners. Here, then, are some of the changed conditions, brought on by the war, that will probably affect consumers in the postwar period.

Migration

The war has caused a great migration of workers. The peace that follows will start other population shifts, but instead of centralization of population in a few big cities, the trend will probably be reversed. Cities won't grow at their prewar or war rate, because their older, multi-storied factories lack facilities for economical straight-line production, have little parking space for workers' cars and are surrounded by slums. Instead, newer and smaller communities will spring up around the up-to-date one-story factories, since these more modern industrial plants are equipped for straight-line production, have adequate parking facilities and, more important, have nearby cheap land on which decent homes can be built for workers.

These communities will be made possible by more efficient transportation. Decentralization of population will also be aided by better communications—improvements in publishing and printing, increases in the number of telephones, the development of such facsimile reproduction as television and radio.

One effect of improved transportation and communication on the consumers living and working in new communities is that branded and packaged goods will be more nationally distributed and advertised. Also, new stores will be needed here, especially for the shopping convenience of consumers, and this will result in some changes in distribution.

The decentralization of population and the springing up of smaller towns will further break down the isolation of farm families. Better off financially than before the war, they will want more of the conveniences of urban consumers. Their packaging requirements will more nearly approach those of non-farm consumers.

Housing and population

The packaging specialist must be concerned with how consumers live. The newer, smaller communities that will result from decentralization of population will force a change in housing. In prewar years the average number of new home units built was usually about 350,000 a year. The war halted all but essential construction, and as a result the United States faces an acute housing shortage. It is expected that one activity to keep the nation out of a depression will be a greatly enlarged home-building program which may well reach 800,000 to 1,000,000 new units built each year for as many as ten years. No enlarged home-building activity after the war could exist solely in the construction of dwellings in the $10,000 to $15,000 price range. Instead, to meet the needs of the masses of consumers, the great bulk of the new homes will probably be priced below $5,000. Prefabrication will become increasingly important.

The new house of tomorrow, in which an increasingly large number of our consumers will live, will have these characteristics: more one-story units; fewer attics and basements; more flat roofs; more windows; fewer, but larger rooms; more dual-purpose rooms; fewer dining rooms; more closet and storage space; more built-in features; more labor-saving appliances—all innovations, it will be noted, designed to make the job of housekeeping less burdensome to the housewife, more enjoyable to the rest of the family. The accent will be on labor-saving and on time-saving. As a corollary, those packaged products which contribute to the saving of time and labor will be more welcome to the consumers of tomorrow.

A larger proportion of packaged products find their way into the kitchen than into any other room. One of the most important changed consumer conditions of significance to packaging people will be the greater mechanization of new kitchens. Faster and more accurate cooking devices, automatic refrigerators with greater capacities for frozen foods, automatic clothes washers and dishwashers and other labor-saving devices—especially in view of the probable decline in size of the servant class in our population—will be found in this room. The kitchen, combined with the dining space and perhaps also embracing a laundry, will be the chief "dual purpose" room in the home of tomorrow. This means that packages will be on display more than ever before.

Commercially manufactured products will more and more have to take the place of home labor. This opens up a whole new vista for packaged merchandise.

Wars cut down the supply of young people in the population. With millions of our men abroad in military service, and with casualties, there will, despite the recent large crop of babies, be fewer young people and fewer children in the postwar period.

Conversely, the older people will constitute a larger percentage of the population of the United States.

It is possible that consumers may divide, after the war, into two rather distinct markets—the young and the old—to a greater extent than was the case in prewar days. The young people who are now in war plants and in the armed services are getting an intensive education in technical developments. To a young soldier, a walkie-talkie is not a marvel of science but merely an accepted part of his life. To young men in the Navy and the air corps, radar is a commonplace, not a hush-hush mystery. To young men and women in war plants, air-conditioning, fluorescent lighting, synthetic rubber, plastics, alloys and other radically new developments are not things to be afraid of, but things to be welcomed.

Older people, unfamiliar with the host of new products developed during the war period, will be reluctant to accept changes. The younger people on the one hand, and the older people on the other hand, should affect the consuming market, not only for products and services, but also for packages.

Predominantly feminine markets

Even before the war, men were numerically growing less important in our population. By 1940, adult women outnumbered adult men by 1,360,000, and war, with its casualties, will still further accentuate the declining importance of the male sex. Therefore the male viewpoint in packaging appeal will be even less important.

Before the war, women were said to buy 85 per cent of all consumer goods. Whatever the percentage was, it's bound to be higher when the war is over, not so much because of the numerical superiority of women, but because of their increased importance. One out of every three women is in the nation's labor force. Many have money for the first time—money of their own. A study made by *McCall's Magazine* among women factory workers in Detroit disclosed that while their average weekly wage before the war was only $26, their average wartime wage amounted to $53. Almost 40 per cent of these women said they wanted to stay in jobs after the war and continue to earn money.

But the fact that women are in men's jobs today is not so important. In many cases, women will give up their jobs to men when the war is over. The important thing about women in this war is their increased knowledge. Now they know men's jobs. They know manufacturing processes. They know quality. They know how things are made. Even women who have stayed at home have increased knowledge because of the war. These housewives know quality, too. They've had to repair, mend and "make do" many of their personal and household possessions. They have a new realization of the value of time-saving and labor-saving products and devices.

While women have always been the buyers of most consumer goods, the new knowledge, the new money and the importance they have acquired as a result of the war will make them an even more powerful influence in the postwar years, with a greater effect on how merchan-

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dise is made, distributed, advertised and packaged.

It is too early to make any predictions as to women's postwar attitude toward grade-labeling and descriptive, informative labeling on packages. It is safe to predict, however, that women will not resent being given as much helpful, informative material as possible on or in the packages which they buy. Women have passed from the known and familiar products of prewar days to the alternates, substitutes and modified products of wartime. They know that the postwar period will bring more changes. They don't know whether manufacturers will return to prewar products when the war is over or change and improve these products. Hence full directions and information are advisable in packaging postwar products.

Because women will outnumber men when the war is over, competition for husbands will be keener. As a result, the woman will be in the market for more products to enhance her charm—more packaged products. As a result, too, there will be more women doing a combination job—working in a store, office or factory and at the same time, maintaining homes of their own, relying on packaged products that will save time and labor.

New package consciousness

Not only women, but men consumers also, as a result of the war, have become more package conscious. Just as a woman, in buying talcum powder, became package conscious when the powder was handed to her in a cardboard, wartime substitute, so a man is made package conscious when he buys his wartime package of tobacco. Both women and men, because of the war, will have increased knowledge of manufacturing processes and materials. They will have seen, either in the armed forces or in their work in war plants, the uses to which plastics, metals, alloys, paper, fabrics and other materials employed in packaging can be put. They will be more critical but more receptive to package improvements and innovations. No one at this time knows what consumer income will be in the postwar years. But one thing we do know: wars cut down the number of the well-to-do and raise millions of the poor into the ranks of the middle-income group. This process, which has been repeated in this current war, has been of benefit to the makers of packaged goods.

Many of the poorer families in the United States, be-

2. With its compact storage facilities in glass-fronted cabinets which permit a full view of the contents, the modern kitchen demands neat, attractive packages which waste no space. Convenience will be a most important factor in package design.

2



3



4



3 and 4. The impact of the war will affect the ideas of the postwar consumer in many ways. Men and women in the armed forces and in the factories have been introduced, often for the first time, to many new techniques and new materials. Even more than their parents, they will demand the ultra-modern in what they buy.

fore the war, had the notion that bulk merchandise was cheaper than packaged products. With the added income from wartime jobs, these families—in many cases for the first time—have been willing to buy standard, branded, packaged goods. The habit of buying packaged goods will probably persist, since it will be evident to these new consumers that packaged products in the standard, branded class are actually more economical than unbranded, unpackaged bulk merchandise of uncertain quality.

This condition is not limited to civilians in our population. It also applies to the men and women who are in the armed forces. Coming from all sections of the nation, these men and women have been introduced through General Issue material or Post Exchanges to products with which they were unfamiliar before they entered the services. Many of the wartime habits will persist, after the war, just as World War I was the means of giving a postwar boost in sales to such diverse articles as cigarettes, collar-attached shirts and wrist watches.

This new market—born of the war—constitutes one of the most significant changes among consumers confronting the manufacturer of packaged goods.

All in all, consumer conditions which the packaging specialist will have to consider in planning for postwar merchandise spell a definite opportunity.

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Using market research

by Don White



1. Product can still be identified on new paper caps of glass containers. Photo Standard Cap & Seal Corp.

Now, when all business is searching out important developments that will affect postwar plans, the packaging field is confronted with a significant trend that started before the war—the trend toward a marketing approach to packaging.

The wartime upheaval in packaging as an integral part of advertising and merchandising interrupted the opportunity of applying marketing analysis to packaging. The same upheaval has emphasized the postwar need for pre-testing and post-testing package sales and merchandising values.

Everyone has seen the wartime scramble that resulted as manufacturers rushed to develop packages of non-critical materials. Wartime shortages which created abnormal consumer demand have meant that the development of new or changed packages could safely concern itself primarily with protecting the product.

Distributors under war conditions can sell many products with little emphasis on display. The element of competitive pricing has been largely eliminated. It is natural, therefore, that packaging during the war has been largely a question of materials and production.

That has been apparent in the nature of recent packaging discussions which have had to do largely with substitute packaging materials and with such production factors as coefficients of moisture absorption, difficulties in vacuum packing and availability of various types of closures. This has been all to the good. A world of information has been amassed during these war months on materials and production factors.

Equally important is the fact that many products have been forced into types of wartime packages which would not have been considered before the war.

Fortunately too, considerable work had been done up to the time of Pearl Harbor in tackling packaging as a marketing, rather than as a personal-taste or aesthetic problem—considerable, that is, in terms of good basic jobs done by a few of the large manufacturers of metal, glass, paper, plastic and transparent sheet packaging materials, but relatively little in terms of percentage of the total potential of consumer goods to be packaged.

In any case, enough had been done to indicate a trend in the direction of pre-testing new packages and analyzing the sales elements of old packages by market research.

Parallel with this are other trends that make such testing by approved marketing methods increasingly important as we move toward peace. Just a few of them that started before Pearl Harbor and that have been speeded by the war will have more and more effect on packaging as an element in merchandising and advertising. Three of these more important trends include:

1. Lower costs of distribution.
2. More informative selling.
3. More complete self-service selling of more lines of consumer goods.

As these basic factors in distribution gain further momentum, the treatment of packaging as a marketing problem will be more pronounced. There will be a disappearance of the old rule-of-thumb method of having an artist bat out some sketches for a label or package and then use one for millions of packages if "it passed the boss and his secretary."

Self-service selling alone has a tremendous influence on packaging. With self-service selling you have great emphasis upon the following:

1. Letting the customer come as close as possible to seeing and feeling the actual product.
2. Establishing quick package identification.
3. Getting maximum display in competition with other items.

One of the leading supermarket operators of the country says the package is so important in self-service selling that his organization will buy and sell almost any product that has an unusually good package.

He would take you into his markets before Pearl

Harbor and show you examples of such well-packaged unknowns that were getting good sales. He would also show you a few well-known products that were so poorly packaged that sales were low even from mass displays, because you could not get any visual picture of what the display contained even at a distance of 10 feet.

He would further point out the obvious fact that every square foot of his self-service markets was display space that must earn its keep and that the manufacturer who helped make that space step up its earnings by good display-value packages was in partnership with him.

Self-service selling is dominant in the food and grocery field. It has also been making rapid gains in other fields of retailing. Self-service in some form is to be found in practically every department store in the country and more department stores are expanding their self-service.

This is not only because of personnel problems and the need for lower costs of doing business, but because the American people, as a whole, like self-service. This has a tremendous bearing on packaging.

One of the large mail order houses, for example, plans to have every item in its retail stores, wherever possible, packaged after the war. Nails, screws, gadgets, tools, accessories and larger items will be wrapped, boxed, bottled, canned, fastened to cards, labelled, or what have you, so as to show the item to advantage.

Somebody has to decide what such packaging shall be for each individual item. If the millions of dollars worth of losses that have resulted from packaging guesswork in the past are to be avoided, plans based on market research should be started now.

This all sounds very well, but it raises the question of how much market analysis can be accomplished on packaging now, when war conditions make such testing difficult or of limited value for peacetime projections. Much can be done in collecting results of any available prewar consumer and dealer studies of packaging to build a foundation for plans and judgement.

Individual manufacturers are making studies for specific items, but most of them hesitate to release results. One of the soap companies, through its advertising agency, is applying market research techniques to the packaging of its cake and flake soaps, but the findings are not available.

The new packages for one line of cosmetics are based on marketing research and there you get some data. Between 50 and 60 sketches were submitted to a carefully selected sample of approximately 1,000 women. This group of consumer interviews lopped off all but 5 or 6 possible designs. Actual dummy packages of these 5 or 6 remaining designs were made up and shown to several thousand women for a final choice. The company is "very happy" about the sales results.

Actual testing of the packaging of some new products to be released when peace comes will have to wait for comparative data on available packaging materials after the war. Because the packaging of new products presents a more complex marketing problem, detailed plans now should be an economy of time and money.

Factors to be considered in such new-product packaging include not only consumer preference, but dealer preference of materials for storage, handling and display.



2. Carton space may be used for a selling job. Brand name explains the product, direct color illustrations invite consumer attention, while recipes give information on how to use it. Photo The United States Printing & Litho. Co.

Distribution changes

by A. B. Gunnarson

If the predictions of serious students of postwar America are fulfilled, manufacturers and distributors in this country must be ready when the war ends to market from 35 to 50 per cent more goods and services than were ever made available to the public in any year previously. One authority has estimated that annual retail sales of $78,000,000,000 will be necessary after the war to provide full employment for workers who will be released from military service and war plants.

To obtain distribution of such an unprecedented volume of goods, it will be necessary to call into play every prewar marketing facility and also to develop additional facilities of new kinds. The flow of this merchandise into the hands and homes of consumers must be expedited, there must be improvement in every form of sales promotion as well as improvement in the physical handling of the goods during each successive stage of their flow from producer to consumer.

It should be obvious that proper packaging of products can contribute much to the attainment of these goals. Products enclosed in attractive packages often sell themselves, thus eliminating entirely promotional efforts of sales clerks. In addition, products enclosed in packages especially designed to facilitate easy handling by distributor and consumer alike reduce the amount of effort required for wrapping and delivering, proper packaging thus being the handmaiden of more efficient distribution.

Manufacturers of consumers goods and the creators of the packages in which goods are marketed therefore have the opportunity of making a substantial contribution to our postwar economy. To make the most of this opportunity, they must maintain a constant awareness of changes and developments in retail merchandising methods and in consumer reactions to such changes.

New merchandising methods

Some of the trends and innovations in marketing are even now being disclosed by current events. Over recent years many significant changes in merchandising methods have occurred which, while suspended for the duration, will undoubtedly be revived with increased impetus when the war is over.

One trend that is readily apparent relates to the physical aspects of retail stores. Exteriors and interiors have been modernized and streamlined. Studies of traffic flow through stores have led to rearrangement of aisles and of displays. Self-service has been given wider application. Old materials such as glass have been put to new uses in show windows, display cases, and shelving. New materials from the plastic groups have found prominent places in store design. Lighting has been recognized as an essential adjunct of merchandising; new forms of lighting, such as neon and other gaseous devices, have been adapted to general and special uses.

These trends will not be diminished because of the present lack of materials for modernization purposes. On the contrary, the longer the war continues, the greater will be the demands for replacement of existing facilities. Thousands upon thousands of merchants are today making plans for better facilities after the war, and many of them are setting aside reserves for financing such new facilities.

Manufacturers of consumers goods who expect to maintain their standing in the market—and those who want to develop a wider acceptance of their products—cannot afford to disregard the signs of the times. Of course, they must have a satisfactory product, and they must develop a method of distribution which will permit the product to be put in the hands of the consumer at the lowest possible price. But an important contributing factor in building a satisfactory volume of sales is the factor of packaging.

Let us examine, therefore, the relationship of packaging to some of the merchandising developments mentioned above. Suppose we begin with self-service as an element influencing packaging.

Self-service has been adapted not only to grocery stores, but is to be found in such fields as hardware, drugs, variety stores and department stores. Packaged products distributed through such outlets should be designed to meet the requirements of the consumer who must make a decision on the spot as to which of several competitive products should be chosen.

The consumer wants to know what the product is, who makes it, how big a quantity he is getting, what it is made of, how to use it or how it works; he wants a definite idea as to its quality so that he can make a quick comparison with competing products on the shelf beside it. In other words, it is desirable that the package carry a label sufficiently informative to enable the consumer to judge the merits of the product without requiring him to seek further data from a sales clerk.

The above suggestion concerning the desirability for more informative labeling of products is not intended to apply only to products which may be sold at retail by means of self-service devices—adequate labeling is helpful not only to consumers themselves but to salesmen and store clerks who are expected to have a thorough knowledge of the products they handle.

Improved store design

The trend in store design which brings displays of merchandise closer to the customer is also apparent in fields which have not adopted self-service. The old-fashioned counter which served as a barrier between customer and shelves of merchandise has been moved forward to permit traffic on both sides, while shelves are now as readily accessible to the customer as to the sales clerk. Cus-

tomers have greater opportunity to get a firsthand familiarity with products on display—they are held at an arm's length from merchandise only in fields such as jewelry where certain protective measures are necessary for high-priced lines.

The wider use of glass and mirrors for display devices introduces another important factor for consideration of package designers. More light falls on displays, mirrors bring reflections of light and of merchandise which is displayed, and these factors should not be overlooked.

Modern lighting introduces other problems for package designers. Some of the new types of lighting cause unusual effects on colors. In designing packages requiring printing in colors, consideration should be given not only to the effect when the product is displayed in natural light, but also to the effects of artificial lights of various kinds. It is desirable that consumers should be able to identify packages of a particular product under any conditions of lighting.

Television a factor

As postwar progress permits the expansion of television so that it reaches an ever-increasing number of outlets, manufacturers will have the opportunity of showing their products on the receiving screen. The importance of package design—shape, typography and color considered—in facilitating consumer recognition of a product should not be overlooked by those who expect to make extensive use of television for informing the public about their goods and services. While full development of television may not come immediately following the end of the war, the opportunities it will bring should be recognized in plans for developing postwar markets.

Automatic salesmen

Busy and hurrying Americans have accepted coin-operating vending machines as a modern device for permitting quick purchase of many articles at convenient points. The penny-in-a-slot vending machines of a generation ago, which caused wide-eyed wonderment of boys and girls, were the predecessors of a long series of contrivances which were developed to the point where we now can buy candy, gum, cigarettes, postage stamps, fruit, nuts, handkerchiefs, and soft drinks by automatic means. And, of course, there is the Automat! The postwar necessity for expanding sales volumes may bring about wider use of vending machines. Products dispensed in such devices require appropriate packaging.

Two important processes

In the food field, the war has accelerated expansion of two important processes which may bring about extraordinary changes in postwar merchandising methods. These are quick-freezing and dehydration.

Fish, vegetables, fruit and meat prepared under quick-freezing processes have found ready acceptance by consumers. A dependable market has been established, and wider possibilities await postwar development as delivery and storage facilities are perfected. Frozen products require special types of packages adapted to the conditions under which the goods are marketed. They must stand up under low temperatures and be moisture-resistant. They could be improved materially by inclusion of an insulating wrapping which would help to maintain the product in a fully frozen condition while being delivered from the grocer's freezer to the customer's kitchen.

Dehydration processes have been expanded extensively in recent years as a result of wartime demands from military, Lend-Lease and relief agencies. A partial list of products available in dehydrated form includes such typical items as milk, soups, potatoes, eggs and lemons, while many other products have been subjected to experimentation. In many instances the dehydrated product is of a different character than the original. When these products are made available for general consumption after the war, consumers will have to be informed about their characteristics and their uses. The rapidity with which these products gain public acceptance will depend partly upon advertising and partly upon the ingenuity of package designers. New products and new forms of old products call for new packages with distinctive features.

Air transportation

In almost all discussions of postwar developments much is said about expansion of air transportation, both for passengers and for commodities. With time and distance compressed by rapid air communications, producers and distributors of many kinds of products will need to adjust their marketing plans. Perishable goods will move faster. Marketing areas will be expanded. Retailers may be able to carry smaller stocks. Thus, the opportunities for postwar transportation by air hold a challenge to producers to develop packaging which will be in harmony with air mail and air express requirements. Lightweight metals and plastics may supply the need.

The 135,000,000 Americans who constitute the consumer market of this country will be eager buyers of the postwar products of America's farms and factories. They have the desire, and most of them will have the means for gratifying their desires. Every legitimate device for making it easy for consumers to buy goods needs to be developed if the total sales volume is to reach the stupendous figures indicated earlier. To manufacturers and distributors the postwar opportunities for making and selling goods are limitless. If the goals which lie ahead are to be attained, the best skills and practices in packaging must be brought into play. In view of the remarkable progress already made in this field, it may be expected that the designers and craftsmen concerned with packaging will fully measure up to their postwar possibilities.

The government program

by J. A. Krug

For some time to come, it will be necessary for our industrial productive economy to continue to operate under Government restrictions. This is one of the chastisements of war; and the aftermath of war, too, will call for careful over-all planning in the uses of materials, not only for packaging, but for every other purpose.

First, it is necessary to bear in mind that while the WPB has certain over-all responsibilities, the detailed planning of wartime production is not in the hands of any one agency. The job has been decentralized so that each governmental department is assigned that portion which is its specialty. Thereby expert knowledge and experience are brought to bear on every problem. The Army is responsible for the Army supply program. The Navy provides warships, naval ordnance, and other specialized naval needs. The Maritime Commission plans the merchant ship program, and a large number of civilian agencies develop the production and construction program required for indirect military purposes and for supporting the basic civilian economy.

The WPB is responsible for the production of the basic materials, components and products which are required jointly for the programs of the other agencies. The WPB also provides, through its Requirements Committee and its Divisional Requirements Committees, for the integration of the production and construction programs sponsored by the military and the interested civilian agencies. In other words, the job of these committees is to balance proposed programs with the productivity of the nation's industrial resources.

Claimant agencies

To carry out this function, the Requirements Committee operates directly with the major military and civilian agencies, fourteen in number, called the "Claimant Agencies." For the purpose of claiming materials and obtaining approval of production and procurement programs, each of these fourteen agencies is assigned jurisdiction over a specific area of production as outlined.

Aircraft Resources Control Office: Production of airplanes and parts for Army and Navy Air Forces and Lend-Lease; construction and facilities for plane production.

Army: All Army ground supplies and matériel (including Army-type Lend-Leased equipment) and related construction and facilities.

Navy: Ships, ordnance equipment, advanced base and continental base construction and related facilities (including Navy production on Lend-Lease account).

Maritime Commission: Merchant shipping and military shipping built in Maritime yards; ship repairs except in Navy yards.

Foreign Economic Administration: Lend-Lease requirements other than military type, including raw materials and industrial equipment of all varieties, and miscellaneous exports to non-Lend-Lease countries, largely Latin American; foreign projects, largely for the United Nations' benefit, such as petroleum, mining, crude rubber development, and lumbering.

War Food Administration: Farm and food processing machinery, food storage, food containers, supplies, and equipment for farm use, farm construction and repair.

National Housing Agency: War housing, both publicly financed (Federal Public Housing Authority) and privately financed (Federal Housing Administration).

Petroleum Administration for War: Oil well drilling, refining, pipe line transportation, and petroleum marketing; construction of high-octane gasoline and related projects; and maintenance and repair for the petroleum industry.

Office of Rubber Director: Production of synthetic rubber and rubber products of all types; construction and maintenance of plants for production of rubber, tires, etc., and rubber-making and rubber-working machinery.

Office of Defense Transportation: Railroad construction and maintenance; production of railroad and automotive equipment and repair parts; local and interurban transit requirements, both rail and automotive; inland waterway construction, equipment, and maintenance and repair.

Office of War Utilities: Requirements for construction, maintenance and repair for the electric power, telephone and telegraph, natural and manufactured gas, water and central steam-heating industries; production of power and communications equipment, boilers, etc.

Office of Civilian Requirements: Consumers' goods and services of all types, including maintenance and repairs for household or consumer use (except farms). The OCR is also responsible for the wholesale and retail trades.

Operations Vice-Chairman: Producers' goods of all types, including equipment common to military and non-military use, such as construction machinery, general industrial equipment, containers, lumber machinery, plumbing and heating supplies, textile machinery, machine tools, etc.

Metals and Minerals Vice-Chairman: Construction and maintenance requirements for the basic minerals industries; production of mining machinery.

Under the Requirements Committee system, each of these Claimant Agencies submits to the WPB, quarterly, a complete description of its proposed production and construction programs translated into quantities of the controlled materials including carbon steel, alloy steel, copper, brass and aluminum. Where other critical materials, such as rubber, lumber, paper, mica, etc., are needed in large quantities, or where proposed programs involve critical common components or the procurement

of end products which are in short supply, requirements data covering all such items are also requested.

The over-all Requirements Committee, on which each of the Claimant Agencies is represented, resolves competitive demands for materials and facilities which cannot be satisfactorily adjusted at the Industry Division level where Divisional Requirements Committees function in the initial process of adjustment among various programs. The Requirements Committee is assisted by the Program Adjustment Committee, which is the task force for distilling the basic facts from the mass of information presented so that the principal points of issue can be focused before the main committee.

As things work out in practice, the staffs of these various committees carefully review the estimated requirements for proposed programs. Civilian and military programs are carefully checked on the basis of past experience and present essential needs.

The industry divisions

At the same time that requirements are under review, each Industry Division responsible for a critical material or product in short supply carefully estimates the expected production for the quarter under review, and in a more summary fashion for the next three quarters. This provides a supply picture corresponding to the 12-month period of programmed production and construction.

Where, after staff analyses, the adjusted requirements for materials, components or products exceed the estimated supply, the divisional requirements committees develop tentative trial balances adjusting the proposed programs of the Claimant Agencies to the forecast of supply. In the case of all basic materials, such as steel, copper and aluminum balances are reviewed by the Requirements Committee.

Controlled materials plan

The over-all program as thus determined is implemented with respect to steel, copper and aluminum under the Controlled Materials Plan, each agency being allocated a sufficient quantity of these materials to provide for the program finally approved by the Requirements Committee. In the case of Procurement Agencies, such as the Army and Navy, the approved program is further implemented by the adjustment of procurement schedules to correspond with the quantities of materials allocated under the Controlled Materials Plan.

Allocation orders

For other critical materials not handled under the Controlled Materials Plan, the approved programs are implemented under allocation and production scheduling orders of the WPB. These orders are used to allocate such materials as rubber, nickel, zinc and many chemicals. Production scheduling orders are used to control the production of all other critical items. Conservation orders promote the use of less critical materials as substitutes, while limitation orders fix the authorized production of those products which are restricted in order to free materials and facilities for more urgent military and civilian programs. At the same time, construction and facilities expansions are limited to projects proved to be essential.

Prospects for the future

The question is frequently asked, "When will we reach the time when civilian production can be resumed or at least expanded from the present minimum level of operation?" This question cannot be answered definitely without guessing the day of ultimate victory. It is clear, however, that there can be no substantial diversion of productive resources to less essential civilian products as long as the war in Europe continues. While the material situation has substantially improved during recent months, our industrial and labor resources are still taxed to the maximum by vital war production programs, some of which are still behind schedule because of labor shortages and component bottlenecks.

The WPB has established machinery for promptly implementing any shift which can be made in our productive programs to utilize fully our productive resources. Few, if any, of the Claimant Agencies have been granted approval for all of the production which they would like to have. The country's transportation systems require more repair materials and rolling stock. The oil industry could use more well-drilling equipment and productive facilities. The utilities could use much additional material and equipment for safeguarding an adequate supply of these essential services. Housing is still scarce in many important war production centers. In addition, of course, there are hundreds of items which the civilian population needs.

While it has not been possible for the WPB to authorize many of these desirable products because of more urgent competing needs, each of them is being carefully analyzed to determine the material, facilities and labor required for their production. They are also being compared as to relative urgency so that when additional production can be authorized without interference with the essential military programs, the necessary changes can be implemented by an orderly and controlled relaxation of restrictive orders.

No class of products is more vital to the continued effectiveness of the war production program, and for that matter to the prosecution of the war, than packaging. Materials of war cannot be distributed to the battle fronts around the world without an adequate and continuous supply of containers and packaging materials.

It is therefore the obligation and responsibility of the packaging industry to continue the amazing record already achieved in conserving materials and in finding better and more economical methods of packaging.

How the department of commerce can help

by Dr. Wilford White

Reconversion from wartime to peacetime economy is receiving considerable attention from the Department of Commerce which keeps constantly aware of business problems and seeks, within the limits of its facilities, to aid in their solution. Though its first obligation is that of serving the war effort, the Department's collection and analyzing of facts continues, and when they can be released, they will serve as an important aid to planning.

Meanwhile, through published reports and analyses, and through personal services both in Washington and in its field offices, many of the Department's bureaus continue to serve the free enterprise system. Highlights of those activities which especially affect the packaging industry in its many phases are briefly listed, by bureau.

Bureau of Foreign and Domestic Commerce

Possessing no regulatory powers and charged by an act of Congress with fostering, promoting and developing the foreign and domestic commerce of the country, this fact-finding service bureau employs industrial analysts who specialize in packaging materials including wood, fibreboard, paper, plastics, glass and metals. Others are concerned with machinery and motive power, transportation, the art of packing for shipments. Still others are experts on containers who, as a specific aid to this industry, are conducting studies on the end-product use.

While it maintains personal contacts, this bureau's principal method of disseminating information is through published reports and releases. Of special interest as basic aids to the packaging industry are the following:

Modern Export Packing: A comprehensive manual, published in 1940, which explores in detail construction of containers, packing methods, considerations affecting satisfactory packing and port facilities throughout the world. (Price $1.00.)

Modern Ship Stowage: Published in 1942 to promote the safe carriage of American export and import goods. It describes how cargoes are received and handled at ocean terminals, the correct way to stow all products, stowage and shipping terms and definitions, weights and measures, laws affecting carriage of goods by sea. (Price $0.50.)

Export and Import Practice: United States techniques in 1938. Includes a chapter on how to prepare shipments for export. (Price $0.40.)

Folding Paper Boxes—An Aid to Profitable Packaging: A booklet discussing styles, designs, production and uses; status of the industry in 1939. (Price $0.15.)

In addition to these, however, various phases of packaging are discussed in the three regular periodicals of the Department of Commerce: *Domestic Commerce*, the monthly organ of the entire department (subscription $1.00 per year); *Survey of Current Business*, a recognized monthly source book for businessmen and research organizations, giving economic highlights, business statistics, indexes, specific reports on many industrial groups, etc. (subscription $1.75 per year); and *Foreign Commerce Weekly* which gives authentic, unbiased information on many phases of international commerce and has published, and will continue to publish, articles on the postwar outlook for international trade. (Subscription $4.50 per year.)

Recent Bureau releases pertaining directly to postwar planning, with material of interest to the packager are:*

Markets after the War: Exhaustive studies to assist marketing analysts to set their sights on a common goal of postwar opportunity. Published in 1943.

Market Prospects after the War: A compilation of 25 reports appearing during 1943 in the periodical, *Domestic Commerce*.

Foreign Trade after the War: A guide to approximate export and import flow assuming that domestic economy will function at capacity levels.

National Bureau of Standards

This bureau, one of the principal research and testing laboratories for private industry and government, publishes *Commercial Standards*, voluntarily recorded agreements among producers, distributors and consumers which set up a standard of quality. Of particular interest to the packaging industry are the reports listed below.

Standardization of Packages: A complete report of special sessions during the 29th National Conference on Weights and Measures dealing specifically with standardizing packages. Published 1940. (Price $0.10 per copy.)

Series of Simplified Practice Recommendations: Issued in 1941 and covering corrugated fibre boxes, folding paper boxes, notion and millinery paper bags, set-up paper boxes, single-faced corrugated-board rolls. (Price of each report $0.05.)

Department of Commerce Field Service

Each of the 12 Regional and 14 District Offices of the Department, strategically located throughout the United States, is staffed by trained men and women who act as liaison officers between the Department and the business public. Much personal service and advice is rendered, a library of Department of Commerce publications is maintained in each office and, to meet the growing need for a convenient source of data, the field offices have built up valuable files on postwar planning material including private as well as governmental releases.

* Any or all of the publications listed herein can be subscribed to or purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.



PACKAGING MATERIALS UNDER GOVERNMENT CONTROL

This check list, alphabetically arranged, shows the principal materials of packaging and the reference numbers of government orders affecting them. The orders themselves, very explicit and detailed, should be consulted for full particulars. This list is as of our press date. Packagers should also be on the lookout for subsequent orders.

PRODUCT	RESTRICTIVE ORDERS
ACETONE	M-352 Conservation Order
ACRYLIC MONOMER & ACRYLIC RESIN	M-260 Conservation Order
ADHESIVES (see "Resins")	
AGAVE FIBRE	M-63-a Conservation Order M-84 Conservation Order
ALCOHOLS	
Butyl	M-159 Conservation Order
Capryl	M-344 Conservation Order
Ethyl alcohol	L-51 Limitation Order M-30 Conservation Order M-69 Conservation Order M-374 Conservation Order
Hexahydric	M-270 Conservation Order
Isopropyl	L-51 Limitation Order M-168 Conservation Order
Methyl alcohol (Methanol)	L-51 Limitation Order M-31 Conservation Order
ALUMINUM	M-1-f and Supp. General Preference Orders
Aluminum pigment and paint	M-1-g Conservation Order
Scrap	M-1-d Conservation Order
ANHYDRIDE, PHTHALIC	M-214 Conservation Order
ANTIMONY	M-112 Conservation Order
ASPHALT	M-63 General Imports Order
BAGS	
Cotton fabric production	L-99 Limitation Order
Cotton textiles	L-99 Limitation Order M-317 Conservation Order M-328 Conservation Order
Grocers' bags	L-261 Limitation Order
Osnaburgs	L-99 Limitation Order M-317 Conservation Order P-116 Preference Rating Order
Textile & paper shipping bags	M-221 Conservation Order
BARRELS (see "Steel Drums")	
BARREL HOOPS	
Copper	M-9-c Conservation Order
Iron and steel	M-126 Conservation Order
BENZENE	M-137 Conservation Order
BEVERAGE BOTTLE CASES (iron & steel)	M-126 Conservation Order
BEVERAGE BOTTLING MACHINERY	L-292 Limitation Order
BOTTLES	
Glass Container & Closure Simplification	L-103 Limitation Order
BOXES	
Corrugated	L-317 Limitation Order M-290 Conservation Order P-140 Preference Rating Order
Fiber	L-317 Limitation Order M-290 Conservation Order P-146 Preference Rating Order
Folding and set-up	L-239 Limitation Order
Steel stitching wire	M-21 General Preference Order
BRONZE	
Powder	M-9-c Conservation Order M-9-c-3 Conservation Order
BURLAP	M-47 Conservation Order
CADDIES	L-239 Limitation Order
CANNED GOODS	
Cans	M-81 Conservation Order
CANNERIES	
Fruits, vegetables and fish canning plant maintenance and expansion	P-115 Preference Rating Order

PRODUCT	RESTRICTIVE ORDERS
FOILS	
Aluminum	M-1-f General Preference Order
Lead	M-38 Conservation Order
Tin	M-43 Conservation Order M-43-b Conservation Order
FOOD BOXES (see "Boxes—Folding and Set-Up")	
FORMALDEHYDE	M-25 Conservation Order
GIFT WRAPPINGS (Cellophane)	L-20 Limitation Order
GLASS (also see "Containers")	
Closures for glass containers	L-103 Limitation Order
Cobalt	M-39 Conservation Order
Container & Closure Simplification	L-103 Limitation Order
IRON AND STEEL	M-126 Conservation Order
Fluid milk shipping containers	M-200 Conservation Order
High-speed steel	M-21 Conservation Order M21-b-1 Conservation Order
Steel drums and barrels (see also "Steel Drums")	L-197 Limitation Order
Tinned & detinned scrap	M-325 Conservation Order
JARS (see also "Glass Containers")	L-103 Limitation Order
JUTE	M-47 Conservation Order M-70 Conservation Order
KOROSEAL	
Vinyl polymers	M-10 Conservation Order
LATEX	
Rubber and rubber products	R-1 Rubber Order
LEAD	M-38 Conservation Order
Lead & tin scrap	M-72 Conservation Order
LINSEED OIL	M-63 General Imports Order
LUMBER (crating, etc.)	M-208 Conservation Order
MACHINERY	
Industrial	L-83 Limitation Order
Plastics molding machinery	L-159 Limitation Order
MANILA FIBRE AND CORDAGE	M-84 Conservation Order M-296 Conservation Order
METAL CONTAINERS (see "Cans," "Steel Drums," etc.)	
METAL SIGNS	L-29 Limitation Order
NAPHTHALENE	M-105 Conservation Order
NAPHTHENIC ACID AND NAPHTHENATES	M-142 Conservation Order
NITROCELLULOSE, SOLUBLE	M-154 Conservation Order
OSNABURGS (see "Bags")	
PACKAGING & LABELING MACHINERY	L-83 Limitation Order
PAINTS & PIGMENTS	
Aluminum	M-1-g Conservation Order
Antimony	M-112 Conservation Order
Bronze	M-9-c-3 Conservation Order
Chromium	M-18-a Conservation Order M-18-a-1 Conservation Order M-18-b Conservation Order
Cobalt	M-39 Conservation Order
Copper	M-9 Conservation Order
Zinc sulphide pigments	M-128 Conservation Order
PAPER AND PAPER PRODUCTS	
Cellophane	L-20 Limitation Order
Paper and paper board	M-241 Conservation Order M-241-a Conservation Order
Standardization and simplification	L-120 Limitation Order

BEVERAGE BOTTLE CASES (iron & steel)	M-126 Conservation Order
BEVERAGE BOTTLING MACHINERY	L-292 Limitation Order
BOTTLES	
Glass Container & Closure Simplification	L-103 Limitation Order
BOXES	
Corrugated	L-317 Limitation Order M-290 Conservation Order P-140 Preference Rating Order
Fiber	L-317 Limitation Order M-290 Conservation Order P-146 Preference Rating Order
Folding and set-up	L-239 Limitation Order
Steel stitching wire	M-21 General Preference Order
BRONZE	
Powder	M-9-c Conservation Order M-9-c-3 Conservation Order
BURLAP	M-47 Conservation Order
CADDIES	L-239 Limitation Order
CANNED GOODS	
Cans	M-81 Conservation Order
CANNERIES	
Fruits, vegetables and fish canning plant maintenance and expansion	P-115 Preference Rating Order
Users of hermetically sealed containers may operate under	P-115 Preference Rating Order
CANS	M-126 Conservation Order M-81 Conservation Order
CARDBOARD	M-241 Conservation Order M-241-a Conservation Order
CARTONS	L-239 Limitation Order
CASEIN	M-307 Conservation Order
CELLOPHANE	L-20 Limitation Order
CHEMICALS	
(see specific chemical concerned)	
Distribution of copper chemicals	M-227 Conservation Order
CHLORINE & CHLORINE PRODUCTS	L-11 Limitation Order M-19 Conservation Order M-19-a Conservation Order
CHROMIUM	M-18-a Conservation Order M-18-a-1 Conservation Order M-18-b Conservation Order
CLOSURES	
Formaldehyde	M-25 Conservation Order
Glass	L-103 Limitation Order
For glass containers	L-103 Limitation Order
Tinplate and terneplate	M-21 Conservation Order M-21-b-2 Conservation Order M-21-e Conservation Order M-325 Conservation Order
COATINGS	
(see "Formaldehyde")	
(see "Phenolic Resins")	
(see "Paints & Pigments")	
(see "Resins")	
COBALT	M-39 Conservation Order
COLLAPSIBLE TUBES	M-115 Conservation Order
CONTAINERS	
Paper and paperboard	M-241 Conservation Order
Formaldehyde (for coatings)	M-25 Conservation Order
Fluid milk shipping containers	M-200 Conservation Order

METAL CONTAINERS (see "Cans," "Steel Drums," etc.)	
METAL SIGNS	L-29 Limitation Order
NAPHTHALENE	M-105 Conservation Order
NAPHTHENIC ACID AND NAPHTHENATES	M-142 Conservation Order
NITROCELLULOSE, SOLUBLE	M-154 Conservation Order
OSNABURGS (see "Bags")	
PACKAGING & LABELING MACHINERY	L-83 Limitation Order
PAINTS & PIGMENTS	
Aluminum	M-1-g Conservation Order
Antimony	M-112 Conservation Order
Bronze	M-9-c-3 Conservation Order
Chromium	M-18-a Conservation Order M-18-a-1 Conservation Order M-18-b Conservation Order
Cobalt	M-39 Conservation Order
Copper	M-9 Conservation Order
Zinc sulphide pigments	M-128 Conservation Order
PAPER AND PAPER PRODUCTS	
Cellophane	L-20 Limitation Order
Paper and paper board	M-241 Conservation Order M-241-a Conservation Order
Standardization and simplification	L-120 Limitation Order
PAPER MANUFACTURE	
Chlorine	L-11 Limitation Order
Chromium	M-18-b Conservation Order
Copper	M-9 Conservation Order
PHENOLIC RESINS	M-246 Conservation Order
PHTHALATE PLASTICIZERS	M-203 Conservation Order
PHTHALIC ALKYD RESINS	M-139 Conservation Order
PHTHALIC ANHYDRIDE	M-214 Conservation Order
PIGMENTS (See "Paints & Pigments")	
PLASTICS	
(see "Formaldehyde")	
(see "Phenolic Resins")	
(see "Cellophane")	
(see "Ethyl Cellulose")	
POLYVINYL BUTYRAL	M-10 Conservation Order
POLYVINYL CHLORIDE	M-10 Conservation Order
PRINTING & PUBLISHING MACHINERY	L-83 Limitation Order L-226 Limitation Order
Copper and bronze	M-9-c-3 Supp. Conservation Order
Parts and supplies	L-226 Limitation Order
Rubber equipment	L-143-a Conservation Order
PRINTING INK (see "Paints & Pigments")	
PULP (see "Paper Manufacture")	
RESINS	
(see "Formaldehyde")	
(see "Paints & Pigments")	
(see "Phenolic Resins")	
RUBBER & RUBBER PRODUCTS	R-1 Rubber Order
Chlorinated Rubber	M-46 General Preference Order
SARAN (see "Vinyl polymers")	
SEALING MACHINERY (see "Packaging Machinery")	

COBALT	M-89 Conservation Order
COLLAPSIBLE TUBES	M-115 Conservation Order
CONTAINERS	
Paper and paperboard	M-241 Conservation Order
Formaldehyde (for coatings)	M-25 Conservation Order
Fluid milk shipping containers	M-200 Conservation Order
Glass standardization	L-103 Limitation Order
Aluminum	M-1-i Supplementary Order
Cadmium	M-65 Conservation Order
Copper	M-9-c Conservation Order
Nickel	M-6-a Conservation Order
Steel Drums	L-197 Limitation Order
Zinc	M-11 Conservation Order
	M-11-a-b-1 Conservation Orders
CONVEYORS & CONVEYOR CHUTES	L-123 Limitation Order
	L-193 Limitation Order
	L-287 Limitation Order
	M-293 Tab. 6 Conversion Order
COPPER & COPPER BASE ALLOYS	M-9 and Supp. Conservation Orders
CORK	M-8-a Conservation Orders
COSMETICS	
Copper Containers	M-9-c Conservation Order
CRACKER BOXES	L-239 Limitation Order
DECALCOMANIAS	
Paper & paperboard consumption	M-241-a Conservation Order
DETINNED SCRAP (see "Iron and Steel")	
DRUMS (see "Steel Drums")	
Rubber Lined	R-1 Rubber Order
DYESTUFFS	
Chromium	M-18-b Conservation Order
Dyestuffs	M-103 Conservation Order
Ethyl alcohol & related compounds	M-30 Conservation Order
Molasses	M-54 Conservation Order
ETHYL CELLULOSE	M-175 Conservation Order
FASTENERS FOR CONTAINERS	M-9-c Conservation Order
FIBRE, AGAVE (see "Agave Fibre")	
FIBRE CONTAINERS (see "Containers")	
FIBRE, JUTE (see "Jute Fibre")	
FIBRE, MANILA (see "Manila Fibre")	
FIBRE, SISAL (see "Agave Fibre")	

RUBBER & RUBBER PRODUCTS	R-1 Rubber Order
Chlorinated Rubber	M-46 General Preference Order
SARAN (see "Vinyl polymers")	
SEALING MACHINERY (see "Packaging Machinery")	
SET-UP BOXES (see "Boxes—Folding and Set-Up")	
SHOOKS (see "Lumber")	
SIGNS (see "Metal Signs")	
SISAL (see "Agave Fibre")	
STEEL (see "Iron and Steel")	
STEEL DRUMS (including barrels)	L-197 Limitation Order
List of products which cannot be shipped	L-197 Limitation Order
SYNTHETIC RESINS	
(see "Formaldehyde")	
(see "Phenolic resins")	
(see "Paints & Pigments")	
TIN	M-43 Conservation Order
	M-43-b Conservation Order
Closures for glass containers	M-104 General Preference Order
Collapsible tubes	M-115 Conservation Order
Tin and lead scrap	M-72 Conservation Order
Tinplate, terneplate & long ternes	M-21-e Conservation Order
TUBES (see "Collapsible Tubes," also "Tin")	
TUMBLERS (see "Glass")	
VINYL ACETATE	M-10 Conservation Order
VINYL POLYMERS	M-10 Conservation Order
WAXED PAPER	M-241-a Conservation Order
	M-351 Conservation Order
WAXES	M-63 General Imports Order
WINDOW CARTONS	L-20 Limitation Order
WOOD (see "Lumber")	
WOOD PULP (see "Paper Manufacture")	
WRAPPING PAPER (see "Paper and Paper Products")	
ZINC	M-11 Conservation Order
	M-11-a Conservation Order

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PACKAGING MATERIALS UNDER GOVERNMENT CONTROL

This check list, alphabetically arranged, shows the principal materials of packaging and the packaging materials of government orders affected thereby. The orders themselves should be consulted for full particulars. This list is in no way complete and should be carefully checked before placing any order. Packagers should also be on the lookout for subsequent orders.

PRODUCT	RESTRICTIVE ORDERS
ACETONE	Solvents (Distribution) Order
ADHESIVES (see also Glue, Paste)	Adhesives (Restriction) Order
ALCOHOL (Industrial)	Industrial Alcohol Order
ALUMINIUM:	
Bars	Non-Ferrous Metals (Control) Order
Circles	Non-Ferrous Metals (Control) Order
Coated Paper	Aluminium Coated Paper Order
Foil	Aluminium Foil (Conservation) Order
Powder	Non-Ferrous Metals (Control) Order
Sheet	Non-Ferrous Metals (Control) Order
Strip	Non-Ferrous Metals (Control) Order
Tube	Non-Ferrous Metals (Control) Order
Wire	Non-Ferrous Metals (Control) Order
ANIMAL FEEDING-STUFFS	Feeding-Stuffs (Restriction) Order
ANTIMONY	Non-Ferrous Metals (Control) Order
ASBESTOS	Asbestos (Control) Order
BAGS (see also Containers)	Bags (Control) Order
BAKELITE	Synthetic Resin and Plastic Materials (Control) Order
BARIUM	Non-Ferrous Metals (Control) Order
BASKETS	Basket Making (Restriction) Order
BEESWAX	Beeswax (Control) Order
BISMUTH	Non-Ferrous Metals (Control) Order
BITUMEN	Bituminous Products (Control) Order
BOOKS	Paper (Control) Order
BOTTLES	Bottles (Control) Order
BOXES	Boxes (Control) Order
BRASS	Non-Ferrous Metals (Control) Order
BRONZE	Non-Ferrous Metals (Control) Order
CADMIUM	Non-Ferrous Metals (Control) Order
CALCIUM CARBIDE	Calcium Carbide (Control) Order
CANS	Tinplate (Control) Order
CARBON BLACK	Carbon Black (Control) Order
CARDBOARD	Paper (Control) Order
CARTONS	Cartons (Control) Order
CASEIN	Casein (Control) Order
CELLOPHANE	Cellophane (Control) Order
CELLULOSE	Cellulose (Control) Order
CHEMICALS	Chemicals (Control) Order
CHINA CLAY	China Clay (Control) Order
CHLORATES	Chlorates (Control) Order
CHLORINE	Chlorine (Control) Order
CHROMIUM	Non-Ferrous Metals (Control) Order
CLOTH	Cloth (Control) Order
COAL TAR	Coal Tar (Control) Order
COBALT	Non-Ferrous Metals (Control) Order
COCONUT OIL	Oils and Fats (Control) Order
COPPER	Non-Ferrous Metals (Control) Order
CORDAGE	Cordage (Control) Order
CORK	Cork (Control) Order
COTTON	Cotton (Control) Order
CRYOLITE	Non-Ferrous Metals (Control) Order
DRUGS	Drugs (Control) Order
DYES	Dyes (Control) Order
ENAMEL	Paint (Control) Order
FATS	Oils and Fats (Control) Order
FELT	Felt (Control) Order
FIBRE	Fibre (Control) Order
FLOCK	Flock (Control) Order
FLOUR	Flour (Control) Order
FOOD	Food (Control) Order
FUEL	Fuel (Control) Order
GELATINE	Gelatine (Control) Order
GLASS	Glass (Control) Order
GLUE	Glue (Control) Order
GOLD	Gold (Control) Order
GRAPHITE	Graphite (Control) Order
GUMS	Gums (Control) Order
HEMP	Hemp (Control) Order
HIDES	Hides (Control) Order
HORSEHAIR	Horsehair (Control) Order
INK	Ink (Control) Order
IRON	Iron and Steel (Control) Order
IVORY	Ivory (Control) Order
JUTE	Jute (Control) Order
KAPOK	Kapok (Control) Order
LACQUER	Lacquer (Control) Order
LEAD	Non-Ferrous Metals (Control) Order
LEATHER	Leather (Control) Order
LINEN	Linen (Control) Order
LITHOPONE	Lithopone (Control) Order
MAGNESIUM	Non-Ferrous Metals (Control) Order
MANILLA	Manilla (Control) Order
MERCURY	Non-Ferrous Metals (Control) Order
METAL POWDER	Metal Powder (Control) Order
MICA	Mica (Control) Order
MOLYBDENUM	Non-Ferrous Metals (Control) Order
NICKEL	Non-Ferrous Metals (Control) Order
NITRATES	Nitrates (Control) Order
NITROCELLULOSE	Nitrocellulose (Control) Order
OILS	Oils and Fats (Control) Order
PAINT	Paint (Control) Order
PAPER	Paper (Control) Order
PAPER BAGS	Bags (Control) Order
PAPER BOARD	Paper (Control) Order
PAPER PULP	Paper (Control) Order
PAPER TUBES	Paper Tubes (Control) Order
PAPER YARN	Paper Yarn (Control) Order
PARAFFIN	Paraffin (Control) Order
PASTE	Paste (Control) Order
PEAT	Peat (Control) Order
PETROLEUM	Petroleum (Control) Order
PHOSPHORUS	Phosphorus (Control) Order
PITCH	Pitch (Control) Order
PLASTICS	Synthetic Resin and Plastic Materials (Control) Order
PLATINUM	Platinum (Control) Order
POTASH	Potash (Control) Order
PRINTING INK	Printing Ink (Control) Order
RAGS	Rags (Control) Order
RAYON	Rayon (Control) Order
RESIN	Resin (Control) Order
RUBBER	Rubber (Control) Order
SACKS	Sacks (Control) Order
SALTPETRE	Saltpetre (Control) Order
SEALING WAX	Sealing Wax (Control) Order
SILK	Silk (Control) Order
SILVER	Silver (Control) Order
SISAL	Sisal (Control) Order
SODA	Soda (Control) Order
SODIUM	Sodium (Control) Order
SOLVENTS	Solvents (Distribution) Order
STARCH	Starch (Control) Order
STEEL	Iron and Steel (Control) Order
STRAW	Straw (Control) Order
SUGAR	Sugar (Control) Order
SULPHUR	Sulphur (Control) Order
SYNTHETIC RESIN	Synthetic Resin and Plastic Materials (Control) Order
TALC	Talc (Control) Order
TANNIN	Tannin (Control) Order
TEXTILES	Textiles (Control) Order
TIN	Non-Ferrous Metals (Control) Order
TINPLATE	Tinplate (Control) Order
TUNGSTEN	Non-Ferrous Metals (Control) Order
TWINE	Twine (Control) Order
VARNISH	Varnish (Control) Order
WAX	Wax (Control) Order
WOOD	Timber (Control) Order
WOOL	Wool (Control) Order
YARN	Yarn (Control) Order
ZINC	Non-Ferrous Metals (Control) Order

What new materials will remain?

It cannot be denied that many of the conversion packages which have been adopted during the past couple of years represent only a temporary expedient, limited strictly to the war emergency period, with no thought or desire on the part of the user for their permanent adoption. Yet, inherent within the idea lies the possibility that some of the present conversion package developments may have produced results which cannot be readily overlooked or discarded in the postwar years. In making an appraisal of this subject we have two major, and definitely conflicting, factors which must be kept in mind:

1. The natural desire of conversion-package manufacturers to consolidate and make permanent the gains they have secured in new markets, which in many cases were never before open to them.
2. The knowledge that when the war is over the package manufacturers who formerly controlled these markets will certainly re-enter them, determined to regain the accounts and volume of business which they had to sacrifice because of the national emergency.

What changes will remain

In considering the determined competition which will result from these conflicting interests, it must be obvious that if the service given by the conversion package does not equal that offered by the previously used package, then there is little likelihood in fact for its retention, all the wishful thinking and hoping of the conversion package manufacturer to the contrary notwithstanding. However, if the conversion-package development has been done on a sound engineering basis, if the newly adopted package satisfactorily fulfills the several requirements of adequate product protection, economy of manufacture and use, adaptability to large-scale production on automatic equipment, and appeal both to dealer and ultimate consumer, then its adoption by the packaging manufacturers may be considered quite likely to be permanent.

For the sake of clarity, it may be well to state that while the above line of reasoning applies to industrial as well as to consumer goods, we shall confine our present appraisal to the latter group, with which we are all familiar and which is very large in total number of packages purchased and used. In so far as packages for industrial products are concerned, these invariably contain large—and frequently bulk—units, which accounts for the fact that protection of the product, serviceability and economy are the all-important factors, with consumer convenience, eye appeal and merchandising value requiring but relatively little consideration.

Note: The author of this article, who prefers to remain anonymous, returned to his company after serving a term in WPB, Containers Branch, then, for their guidance, made a thorough study of typical substitute packages.

What the changes have been

In order to gain firsthand information about the thousands of conversion packages which have presently replaced former ones, it is but necessary to visit a few retail stores where the character and extent of the changes will become readily apparent. In such a study it will be noted that there have been eight major changes:

1. From solid-metal packages to all-paper packages.
2. From solid-metal packages to paper packages with metal ends.
3. From solid-metal packages to glass containers with metal closures.
4. From solid-metal packages to glass containers with non-metallic closures, i.e., paper, plastic or wood.
5. From metal-end packages to all-paper packages.
6. From foil-wrapped packages to all-paper packages.
7. From nailed-wooden packages to all-paper.
8. From cellophane packages to all-paper packages.

The term "all-paper" is used above in its generic sense, embracing:

1. All kinds of papers—whether sulphite, sulphate (kraft), parchment, glassine or cellophane, used in single thickness or combined in several plies, with or without special adhesives, and used as inner liners, wrappers or bags.
2. All kinds of paperboards, regardless of the fabricated form, whether in folding or set-up boxes, spiral or convolutely wound cans, cones or cylinders, and used in single or multiple thickness, with or without special adhesives, lacquers or other protective coatings.
3. Any combination of papers and paperboards.

While it would be possible to compile an almost endless list of products now appearing in conversion packages, we can readily illustrate the extent of the changes effected by examining a representative number of products sold in three major types of retail outlets, namely drug, grocery and hardware stores. In order clearly to indicate the nature of the change, a numeral has been placed following each specific product, corresponding to the eight changes tabulated previously:

Drug Store Products

Adhesive Bandages	1	Hair Dressings (Negro)	1
Aspirin, Cold, Laxative Magnesia Tablets	1	Laxatives, Granular	5
		Manicure Cotton	1

planning for reconversion



All-paper packages have been a chief wartime replacement for containers of metal and other critical materials. Metal ends and closures are used in some cases. Glass with non-metallic closures has also had a role in replacing some all-metal packages.

Bath Salts	1	Milk Sugar	5
Bicarbonate of Soda	1	Nursing Nipples	8
Boric Acid	1	Saccharin Sodium	5
Brewer's Yeast	5	Talcum Powder	1
Brushless Shave Cream	3	Tar Soap	1
Epsom Salts	5	Tooth Powder	1 and 4
First-aid Kits	1		

Grocery Store Products

Baking Powder	2	Frozen Eggs	1
Bouillon Cubes	1	Fruit Cake—5 lbs.	1
Cheese—5 lbs.	7	Fruits and Vegetables	3
Chewing Gum	6	Lighter Fluid	4
Chewing Tobacco	7	Little Cigars	1
Chocolate Wafers	8	Molasses	3
Chocolates, Assorted	1	Pipe Tobacco	1
Cigarettes—20's	6 & 8	Plug Tobacco	1
Cigarettes—50's	1	Popcorn	1
Cigars—50's	7	Potato Sticks	1
Cocoa—1/2 lb.	1	Salt Codfish	7
Coffee—1 lb.	1 & 3	Salted Nut Meats	1
Coffee Substitute	1	Scrapple or Souse	1
Cookies—5 lbs.	1	Shoestring Potatoes—3 1/2 oz.	1
Dates—2 lbs.	1		
Dehydrated Vegetables	8	Shortening—1 lb.	1
Disinfecting Powder	5	Shortening—3 lbs.	4
Dog Food, Dehydrated	1	Spices	1
Fish Fillets, Fresh and Frozen	1	Tea	6

Hardware Store Products

Battery Boxes (dry cells)	1	Paints and Varnishes	3
Bird Seed	1	Paint Brush Cleansers	3
Camphor Tablets	1	Piston Rings	5
Faucet Washers	1	Plant Food—1 lb.	5
Fish Food	5	Scouring Powders	5
Lawn Seed	5	Water Color Paints	1
Lunch Kits	1	Wax Crayons	1
Moth Exterminator	1	Wooden Forks and Spoons	8
Nails, Household Assortment	1		

An examination of this representative, though incomplete list of products, which are being marketed during the war period in conversion packages, will show that they comprise three broad groups:

1. ***Dry products***—Powders, Granular and Shredded, Pills and Tablets, Solids.
2. ***Moist and viscous products***—Creams, Pastes and Spreads, Solids.
3. ***Fluid products***— Watery, Oils and Syrups.

How products are adversely affected

While at first glance most of the conversion packages, now in use, may appear to be satisfactory, it would be foolish indeed to either praise or condemn them as a whole. It is only when we know what changes may take place to affect an individual product adversely, the cause of these changes and what protective qualities are therefore necessary, that we can intelligently judge how well or how poorly the conversion package is doing its job, and then hazard a guess on its probable retention or discard in the postwar period.

In general, there are ten possible ways in which a product may be adversely affected:

1. Change in physical state, from its natural size, shape or structure, such as dry, moist or fluid to some less desirable form.
2. Change from soft and pliable to hard and brittle.
3. Change from thin to thick.
4. Change in appearance.
5. Change in color.
6. Change in taste.
7. Change in odor.
8. Change in acidity or alkalinity.
9. Change in edibility.
10. Change in chemical structure, bacteria count, etc.

Seeking the reasons for these unfavorable changes, we find that there are eight major causes. They are as follows:

1. ***Air***—Dry air may cause the product to give up some desirable feature, such as loss of moisture in tobacco. Moist air, absorbed by the product, may change its form, such as a fine powdery substance becoming hard and lumpy. Hot air may effect a change within the product, such as causing a white bloom or coating to appear on chocolates.
2. ***Gas***—Gas may be formed in the product, such as carbon dioxide in ground coffee.
3. ***Water***—Water coming in contact with the product may render it useless, such as rust forming on the finely ground metal surfaces of piston rings.
4. ***Moisture-vapor***—A combination of air and water may cause the product to form into lumps, such as in salt, sugar, baking powder or flour.
5. ***Extreme heat*** may cause a product to melt, cloud up, become discolored, turn rancid, generate gases or cause some chemical change to take place within it.
6. ***Extreme cold*** may thicken, solidify or cause a change in taste, such as in fresh vegetables.

7. *Light*—Exposure to, or the infiltration of, certain light rays may variously and negatively affect products, such as: causing certain colors to fade, causing nut meats or dried eggs to become rancid, causing dried eggs to generate harmful gases, causing photographic film to be ruined by premature exposure, causing chemical changes in medicines.
8. *Packaging materials*—The product may give up its own distinctive flavor and absorb some foreign odor peculiar to the materials used in manufacturing the package, or there may be discoloration of the product by a reaction set up between some element in the packaging material used and the product.

How the postwar package will be developed

In pointing out the possible ways in which products may be adversely affected, and naming the principal causes for these changes, our purpose has been simply to emphasize the fact that the value of a particular kind of package cannot be determined by casually examining it. And we are further convinced of the fact that many of the opinions being cast around these days about the certain retention of certain conversion packages and the just as certain discard of others, have no foundation in fact. They are actually the result of sheer guessing or merely wishful thinking on the part of manufacturers who hope to retain their present markets.

The sound development of an entirely satisfactory package for the postwar days will follow pretty much the same painstaking study and research that went into the development of an entirely satisfactory prewar package. The new thing which has been added is the fact that the entire subject of protective packaging has been given new emphasis, with the result that things for years considered impossible have been studied and most encouraging progress has been made. Thus instead of being confined to one or two ways in which a certain type of product can be packaged, there are now several potentials which must be investigated and studied, before arriving at a final decision.

It is plain foolishness to believe that every product which was formerly packaged in metal, and switched to some form of paper "for the duration," will immediately revert to metal once the hostilities cease. On the other hand, it is as foolish to believe such products will all remain in paper and be lost forever to the metal package manufacturers. While there is bound to be determined competition between the manufacturers of various kinds of packages, if the product manufacturers have really profited by their war experiences, they will probably act less on guessing, "hunches" or mere precedent, and will resort to a truly package engineering approach, and through careful study and testing arrive at decisions based on accurate facts, rather than on what they used prior to the war—or were forced to use during the war.

The package engineering method

Utilizing the package engineering method of developing a suitable package involves an orderly procedure, by and through which every major factor is given due study and consideration. A typical outline for such a study would include:

1. Setting down in writing complete information about the product and the size unit or units in which it will be packaged.
2. Determining the factors which may adversely affect the product and the specific ways in which the product may be changed thereby.
3. Establishing the exact protective qualities which must be provided in the package.
4. Securing accurate data about all available packaging materials both new and old, and used singly or in combination, which through impartial and accurate testing can be shown to possess the necessary protective qualities, and thus be proved as potentially suitable.
5. Studying the structural design of the package to develop the best possible style, in relation to furnishing maximum protection of the product, most effective use of packaging materials, economy, consumer convenience, etc.
6. Determining how the package may most economically and efficiently be used in the factory, either with existing equipment or readily available hand, semi-automatic or fully automatic equipment, depending upon contemplated volume.
7. Studying how the package may be made to meet the practical needs of the retail store owner as to storage, display and handling, as well as enhancing the attractiveness and profitability of his store.
8. Determining how to build maximum merchandising value in the package, i.e., pleasantly to attract the consumer's attention, win her confidence by showing what the product is, what it will do, how to use it correctly, and finally to stimulate her to buy it immediately.

The value of such a systematic study to the manufacturer of a consumer product is that it gives him an opportunity to consult on a very definite basis with the manufacturers of each packaging material and kind of package. In this way he proves the real value of each material for his particular product. While it will probably not discourage the current speculation for and against many of the conversion packages now in use, it will certainly provide the thoughtful manufacturer with a safe and sure way of positively answering for himself the pertinent question: "Will my conversion package last in the light of postwar conditions?"

What do machinery users want?

by L. W. Kendrick

Packaging equipment users have been giving much thought to what they would like to have after the war. Replacement needs have been growing, and enlarged sales and the prospect of new items point to considerable purchases of equipment. Also, increasing labor costs highlight the need for further mechanization, the supplanting of semi-automatic machines by automatic machines and the mechanizing of hand work.

Obviously, most users will welcome the time when machines are obtainable again and for a while will be glad to get the foremost prewar designs if nothing else is available. But the war interlude has been long enough for users to crystallize their desires for improvements. Cumulatively, observations of the various faults, small in themselves, have built up in users' minds the need for major design improvements.

The prewar years provided machines that would "run." The postwar wants are for machines that will operate consistently well. As these wants are analyzed, as users ask themselves what postwar equipment design should do, the following specifications become clear.

Reduce the human element to a minimum—To this end, feeding, setting and servicing should be made easy. This involves unscramblers, setting without the use of tools, and built-in lubrication.

Have a maximum output—To this end, the design should be such that the maximum practicable operating speed is fully maintained without stoppages due to breakage or spillage. This involves designing to handle abnormally wide tolerances with improper positioning affecting only the package involved, rather than making a breakage of glass or machine the penalty for faulty material or positioning. It also involves avoidance of abrupt changes in motion and ease of cleaning up spills.

Operate normally throughout its life—To this end, the human element should be at a minimum in lubrication and other servicing, and such wear as affects the quality of the output should be automatically taken up.

Be safe to operate—All pinch or seizure points should be guarded with transparent guards if necessary so that a careless person will be protected as well as is now done with modern electrical installations.

Look its best—Appearance should be improved to give the feeling of competent design, if nothing more. Users are taking more interest in providing attractive working conditions for several cogent reasons and machine appearance is a large factor. Too many machines look as though they were just copies of a first experimental model.

The human element, fallible and costly as it is, gives users major concern. Many strides have been taken by machine builders in reducing its impact, but many more are desired so that fewer operators are needed on a line.

Feeding should be simplified by the further development of unscramblers, or other mechanical means, so that machines may be designed for greater line speeds. The present capacity of a feeding operator should not be accepted as a limiting factor. Fillers, cappers, labelers and cartoners should require no operator attention whatsoever during a run except for feeding the magazines.

Inspection and packing should be further mechanized. Except in the cases where bundlers are used, this station in a line is still essentially hand work. Corrugated carton sealers have progressed a long way on this road, but carton stacking on skids is still hand work, either at the sealer or at the end of a delivery conveyor. In many cases, at the present line speeds, the use of automatic sealers is not economical because of the necessary presence of a stacking operator with time available to hand glue the cartons.

Simplify set-up

Set-up should be greatly simplified so that unskilled operators can readily change sizes. The skilled set-up man of today should devote his skill to true maintenance of equipment. Machine designers have gone part way in this respect, but where hand-crank adjusting means are provided, in some cases a mechanic's wrench is necessary to unlock the setting. The use of such tools for set-up should be avoided. The need for judgment in set-up positioning should be designed out of the equipment. Gauge points should be provided so that the glass may be used as the gauge, or else easily demountable single-use heads should be employed.

The chore of hand lubricating should be eliminated as far as possible and this should be done in the basic designing rather than by the addition of automatic lubricators. Where it cannot be eliminated, such lubrication should be from one or two readily accessible points. Oilless bearings, short motions hinged on flat springs and hydraulically operated motions are examples.

Simplification should be sought for many reasons, not the least of which is accessibility in case repairs are needed. Further thought will show cases where a few parts will do the work of many.

False simplification should be avoided, such as elimination of bronze bushings where repair is greatly hampered without them. Split cams should be used where removal of plain cams would be difficult. Built-in motors, clutches and main drives should be given special attention from this point of view. Especially, care should be taken that all parts are plainly identified.

Eliminate delays

Consistent operation requires that the equipment be designed to accept and pass through occasional faulty glass without breaking the glass or altering its ability to handle subsequent normal glass. For serious abnormali-

ties in dimension, automatic rejection means, possibly of an electronic nature, should be considered. Faulty glass or positioning should not cause breakage or permanent distortion of machine parts, or change the setting. The percentage of defective glass is, of course, very low, but breakage in the machines magnifies it a hundred or a thousand-fold as far as output is concerned, and makes for a very appreciable cost factor. Some limit of pressure should be designed into any movement acting on the glass, either by the use of spring releases, by using the limitation inherent in hydraulic movements or by other means. Synchronization of the several machines in an automatic line will help.

Obviously, normal glass should not be broken, yet some present designs shock the glass too close to the breaking point and result in surface bruises, with attendant reduction in ability to withstand later shocks along the line. Occasionally, difficulties at the glass manufacturers result in glass of less than normal strength. Improper annealing due to trouble with the lehrs, or so-called "cordy" inhomogeneous glass due to pulling on the tanks too fast, many cause breakage where the impact is severe.

With all this taken into account, there still will be leakers, with openings too small to release the filling vacuum. Therefore, the path of travel should be easily cleaned and provision made to prevent spillage from reaching other parts of the equipment or soiling the floor. More thought should be given to link belt conveyors whose pins are "frozen" by the products which may leak or spill out of the bottles.

Retain initial quality of output

Consistent operation requires also that, as a machine wears, the quality or speed of output should not be affected, and this wear should not introduce the necessity of judgment in the set-up adjustments.

That a machine must be safe to operate cannot be too strongly stressed. Most bottling equipment is poor in this respect. There are many positions which can crush fingers and break bones and while operators should not get near them with machines in motion, carelessness or over-confident familiarity should not have this opportunity of causing accidents.

In others, only guards can really make it safe. The design of these guards should be such that the machine will not operate when they are displaced. Where motions must be observed in a diagnosis of trouble, the guards can well be made of transparent plastic materials.

Improve over-all design

Sleek appearance and functional design are desirable for several reasons. Attractive working conditions, developing pride in cleanliness and generating a feeling of design competence have been mentioned. Another is that such designing often goes far toward guarding dangerous conditions, enveloping them with smooth contours. Opposed to this covering up is the reasoning that lubrication will be overlooked if parts are hidden, but if more attention is given to the designing out of these conditions, several benefits may be obtained.

The design of the machine should include all accessory equipment as integral parts of the main unit, hidden perhaps, yet accessible. Pumps, switch boxes and fuse panels are examples. Push buttons or toggle switches should be the means of controlling automatic equipment, plus built-in automatic shutoffs.

This unity will aid much in providing flexibility of use. Machines then can be provided with casters or other means making for portability. This will be helpful in many types of plants. Variable speed drives add further to flexible use and means for adjusting the working height should not be neglected.

The need has been mentioned for several new accessory machines, but not to be omitted is the very real desire for junior models of current machines. True, a large proportion of mechanically handled glass is in the quart and pint sizes, and today most machines are built with these in mind. But there is also a large volume of glass to be handled from $^1/_4$ oz. to 2 oz.

Automatic machines designed primarily to handle quarts have been adapted fairly successfully to handle some bottles as small as $^1/_2$ oz., but it is very much like cracking a nut with a steam roller. Smaller editions to handle the smaller sizes would be welcomed for several reasons. The lower cost would open up new opportunities for mechanizing, space would be conserved.

Where and how

In all of these comments, the attempt has been toward constructive criticism and toward visualizing the broad problem of mechanization from the experience of users rather than from the view of the equipment builders. Yet there is no thought of belittling the very real progress that has been made in this field in the past by the ingenious designers of various types of packaging equipment. Rather, the intent is to say hopefully, "Let's not be content with minor improvements."

How this can be accomplished is a wide-open question. Designers have, no doubt, been giving as much thought as is possible to these matters in view of their wartime problems. They may have many answers to these suggestions already on the drawing boards. But the feeling among users is that the pressure of the necessity of these suggestions would be felt much more, if designers could see more at first hand how their designs are working out.

It may be that only new entrants to this field, those who must look to converting from war goods to peace goods, can "see the forest for the trees." It may be that users must design and build their own equipment. But thoughtful users are confident that somewhere, somehow, strides will be made toward better equipment.

XUM

What do machinery makers plan?

Packaging machinery changes ranging from improvements to "revolutionary" new models are on the drawing boards and will be released as rapidly as war conditions permit.

This is the consensus of information from leading equipment manufacturers in response to the challenge from L. W. Kendrick, chief engineer of Carter's Ink Co., who in the preceding article (which also appeared under the title of "An Engineer Speaks for the Future," in the December issue of MODERN PACKAGING, outlined features which he as a packager hoped to find in his postwar machinery.

Nearly all the manufacturers declared flatly that Mr. Kendrick's idealistic objectives are attainable. Some said that they have already been attained, and pointed to machines already in operation which incorporate some or many of the desired features. But it was conceded that it would be difficult to put all of the features into one machine capable of handling small packages or large, long runs or short—at a price which would be practical for the average packager. Most manufacturers felt that it was just a question of, "How much is he willing to pay for these things?"

Here are typical replies from manufacturers of packaging equipment:

Manufacturer "A":

Mr. Kendrick's objectives are attainable, and, as a matter of fact, there is equipment on the market that would fill some of his needs or could be adapted to his needs. Just as it is impossible for any one machinery user to be fully informed about all of the equipment that is available, it is also impossible for any machinery manufacturer to get his message across to all of the potential users of his equipment. It is quite often the case that a production man acquainted with the procedure and practice in his field may not be aware that some packaging machine built for an entirely different purpose and used in an entirely different field could be adapted advantageously to his needs.

It should also be pointed out that some features mentioned by Mr. Kendrick as being ideal from a standpoint of glass only, can be furnished, although at an extra cost and possibly at the sacrifice of versatility. For example, change parts which require a minimum amount of judgment on the part of the operator and maintenance force can be provided for specific containers, although to attempt to adjust them to fit a large variety of sizes of containers without provision of additional expensive change parts would not be practical.

It is entirely possible that there is need for an automatic machine designed especially for small containers. Until the present, our experience has been that the demand for high-speed automatic filling equipment was primarily for quart and pint bottles, and that the runs of small containers were relatively short and did not justify a separate production line.

Our engineering department has been working on improvements and new types of equipment, but under existing conditions of material procurement, it has not been possible to put them on the market.

Manufacturer "B":

There is nothing in the suggestions which are at all impossible. But how far you can go with the design of a machine along the direction of maximum speed will depend upon how much a customer is ready to pay for it.

We think that the point of perfecting a machine so that it will operate normally throughout its life is a very good one, and one which will tend towards the use of more anti-friction bearings, perhaps, rather than oil bushings.

Manufacturer "C":

All of Mr. Kendrick's objectives are attainable. There is nothing in any of his points which should cause any serious difficulty for the machine designers, primarily because many of them are already now incorporated in packaging machines. Secondly, it must be borne in mind that machine designers must always be two or three steps ahead of the consumer as otherwise no new types of machines would be built.

In his article Mr. Kendrick speaks primarily of bottle filling and bottle handling, which constitute only a small part of packaging equipment. The packaging of brittle objects, or the handling of such products as cigarettes or cigars, presents difficulties which are at least as troublesome as those mentioned, if not more so.

The maximum output, of course, depends on the filling speed. I do not believe any packaging machine today is operated at its maximum mechanical speed, and the only way to get maximum output corresponding to the maximum mechanical speed is to use multiple fillers. Many such multiple-filling devices are in use today, but you will always find them where there is a question of frequent changing from one size to another.

One other difficulty in obtaining maximum output is that if we have manual feeding, the speed of the machine must correspond to the optimum speed of the feeder or feeders.

I feel quite confident that when this war is over we will have many new improvements. The chances are that all machine designers have something up their sleeves which they will spring at the proper time.

Manufacturer "D":

We believe that Mr. Kendrick's objectives are attainable to a very great percentage, if not totally. Improve-

ment of a machine system should be the goal for which every manufacturer aims.

We have plenty on the drawing boards trying to meet his requirements, but how much of it can be accomplished in postwar depends upon the length of time the war will continue.

Manufacturer "E":

I think, in general, Mr. Kendrick's objectives are attainable. Advances have been made in types of equipment which involve kick-out mechanisms, where the material to be handled is defective. This eliminates breakages, but does cause a stoppage of the production flow.

On this subject, I think a good deal more could be done by the manufacturers of containers to throw out over- or under-size packages before they reach machine handling. The buyer should be willing to pay a premium for such service, provided it is adequately performed. It would surely reduce production interruptions due to stoppages, breakages and clean-ups.

Hand-wheel changes and adjustments are now common and practical. Gauges are set on machines for this type of change-over device, and charts are furnished to set the machine to handle each particular size.

I think many designers have gone to extremes in so-called "streamlining" equipment. Much of this is done to cover up moving parts, but almost invariably this also means covering up lubrication points. I know of cases where builders of machinery have been called on to cover up their equipment in order to have it present a smooth appearance, but shortly after their installation, these shields were removed and thrown away, never to be used again. A good deal, though, can be done in the design of frames to eliminate dust-catchers and other protuberances, and the smart machine designer will strive for a happy medium.

I dare say that companies in the liquid field are now wide awake to Mr. Kendrick's criticisms, and are taking steps to overcome them in a practical way.

Manufacturer "F":

I agree with Mr. Kendrick's ideas and I think they are attainable based on the knowledge I have of the label paster field. We now have on the drawing board a new model label paster which will be revolutionary over the present type of labelers.

Manufacturer "G":

Some of the points brought out by Mr. Kendrick's article might as well be applied to packaging machines involving the use of paper as to the products about which Mr. Kendrick was writing. As a matter of fact, every single point brought out by Mr. Kendrick can be applied to improvements which should be made in all types of packaging equipment with which we are familiar.

In my opinion, the first point he brings out, "reducing the human element to a minimum," is the most important because so many of the machines now being used get out of adjustment very easily and require the services of an expert mechanic, whereas they might be designed so that adjustments could be made by the machine operator. More recently designed packaging machines, I think, have a definite trend in that direction.

If this point were emphasized, it would follow that the machine would "operate normally throughout its life" because, with proper supervision, the operator could make the adjustments which would keep the machine in proper running order. I think it might be added that the machine should be flexible in regard to changing to accommodate different sizes of packages within a given range, and flexible enough to handle different materials.

A year or so ago, we made a rather thorough study of bread-wrapping machines in use, and our engineer—who happened to be studying that particular problem—felt that fairly simple changes could be made in the design of the bread-wrapping machine so that the operator could change the plates from those required for sealing wax papers to those required for sealing cellophane in a very few minutes. A baker who now operates a single machine for both types of packaging material has a long, tedious job of cleaning up the sealing unit to change from wax paper to cellophane. Some fairly simple changes could be made so that the existing machines could handle products other than the wax paper for which they were originally designed, more satisfactorily.

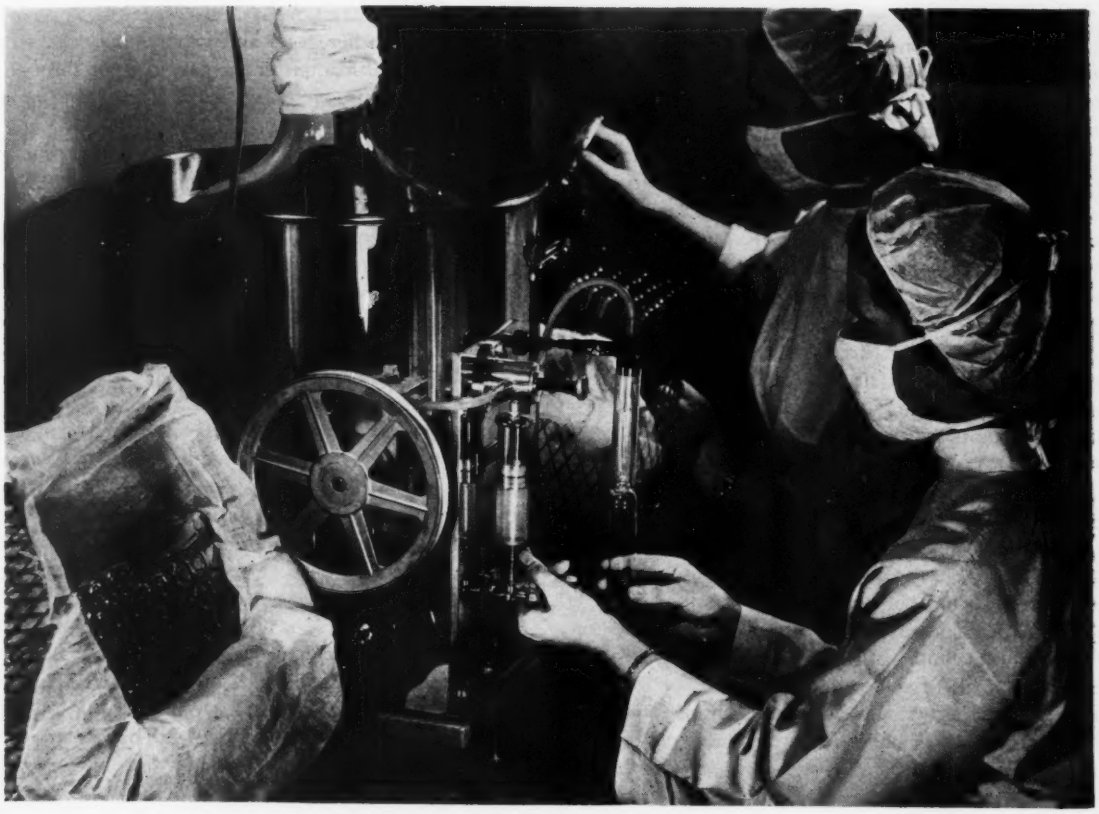
It seems to me that some of the manufacturers of packaging equipment should work more closely with manufacturers and convertors of the packaging materials in bringing out new models.

Manufacturer "H":

In general, I think Mr. Kendrick's objectives are attainable, although some of them may be a little too ideal. He says fillers, cappers, etc., should require no operator attention whatsoever during a run except for feeding the magazines occasionally. That would be very nice, but we have always contended that any automatic machine requires an attendant—not necessarily an operator, but someone to be there and keep an eye on it.

Manufacturer "I":

Mr. Kendrick is talking primarily about glass packaging machinery which we do not manufacture. But we do feel that there unquestionably is room for improvement in many of the packaging machines now on the market (including our own), and needless to say, our engineers are actively engaged in redesigning some machines and in designing new machines in some cases for handling dry products in packages—all of which we will announce in due time when we are able to return to our own field of manufacturing.



1. A major triumph of packaging research has made possible the delivery of penicillin to the battle fronts. Without proper packaging, the unstable drug would deteriorate.

The continuing importance of research

by Dr. T. M. Hill and T. B. Strohm

In Grandfather's day the cracker barrel was an "institution" in the general store and was fairly representative of packaging progress—circa 1900. Two generations have seen many changes, and the cracker barrel has been rolled aside to make way for bags and boxes. The lowly cracker, along with countless other former barrel-merchandised products, now goes to market in a snug sanitary container, and the local seers who used to spend their evenings holding down these barrels now hold down jobs on the night shift at the shell plant up the street.

The evolution of cracker merchandising is a good example of what has happened to packaging during the last 40 years. The fact that we now can buy our crackers fresh, clean and crisp in packages that are resistant to moisture penetration is one more tribute to research.

Even in the cracker barrel era, a certain amount of research was required. The shape of the barrel, for example, was calculated for maximum strength and capacity. The wood was selected for its ability to keep its shape without warping or splitting, and the wire hoops and nails were placed at strategic places to strengthen it.

Similar research has followed the whole pattern of packaging progress, with each year bringing its quota of refinements. The first paper bags were a far cry from the present product. Treatment of wood pulp to make better paper was one step in the right direction. Later came various liners of plastic and foils, more effective adhesives and refinements in printing to give the bag more eye appeal. The importance of the paper bag in everyday life is realized when we consider the total annual prewar consumption in this country—about 50,000,000,000 bags.

The development of the cardboard box has likewise been aided by research. An important step was the teaming up of cardboard with other material to give the box better characteristics. These other materials included waxed papers, plastic liners and metallic foils.

In many cases the product itself has been the chief factor in determining the shape of the container. Packaging

experts have had to consider the density or bulking value of the product, its abrasive properties, chemical characteristics, oil, grease and water content, and its tendencies to form gas under certain conditions.

Often geography has played a part in deciding the type of package needed for a product. Hot, humid latitudes present packaging problems not encountered in the more northern climates. Sometimes, a product must be packed for all-climate service—the small plastic-coated aluminum-foil packets that carry powdered coffee and dehydrated lemon powder to our armed forces all over the world are examples of this. Ration kits in general have presented serious problems to packagers and many new things are being learned in this field that will have interesting effects on postwar packaging.

In recent years, the moisture content of packaged materials has become a matter of prime concern to manufacturers. In some cases the moisture content of the product must be held within relatively close limits to maintain palatability, flavor and other properties; in other cases the product must be kept as dry as possible; in still other cases the package must withstand total immersion in water for indefinite periods without spoilage of the contents. For all of these tasks, there are available a variety of materials which range from fibrous products such as paper—which have little resistance to penetration by moisture—to the metal foils which are completely impervious. In between, are materials varying widely in their resistance to moisture penetration. In addition to selecting the material, there are also the problems of constructing the package and sealing it.

In this connection some packaging materials, such as paper, pass moisture by penetration through pores. Many of the synthetic films are not porous in the ordinary sense but, because they dissolve moisture, carbon dioxide, and other gases and vapors, they can still be penetrated by diffusions of the gas or vapor through the film. All of this, of course, makes the testing problem more complicated.

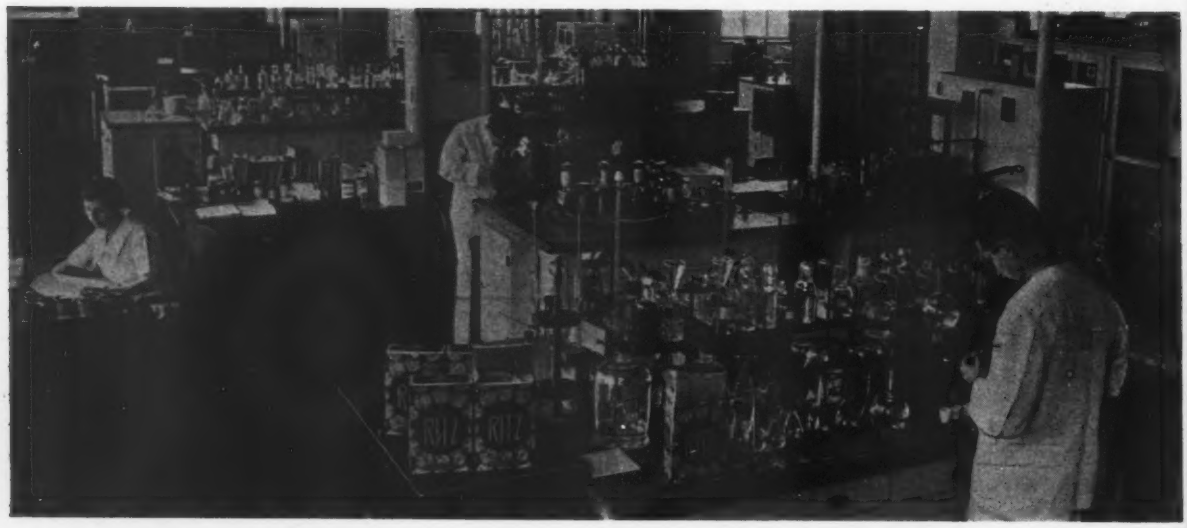
Packaging progress in postwar days will depend more than ever upon research. The packager will have at his command many new materials. The investigation of the characteristics of these materials and the application of them to packaging problems represent an immense job. Not only will it be necessary to understand the properties of each individual type of paper, plastic film or metallic foil used, but also the combined characteristics of the countless combinations possible.

Much work in the standardization of tests and the accumulation of data on chemical properties of packaging materials will have to be carried out in the postwar era. These latter include water-vapor permeability; permeability to fixed gases, air, carbon dioxide, oxygen and nitrogen; permeability of organic vapors; and the penetration of water, oil and grease. Also important are problems of aging and the specific effects of temperature, oxidation and light.

The mechanical requirements of tomorrow's packages will present an additional set of problems. Mechanical tests of the package by compression, tumbling and impact must be defined and standardized. The final tests will include most rigid examinations by packaging experts carefully trained to detect even minor imperfections.

It is a logical assumption that improvements in packaging are simply a matter of applying scientific principles and taking advantage of the modern materials available to packagers. Tomorrow's packages will be scientifically constructed to do an economical and efficient job of protecting products from producer to consumer, and research will play a prominent role in their design.

2. Manufacturers of consumer goods often maintain laboratories for testing packaging materials. Photo National Biscuit Co.



War lessons that will last

by J. D. Malcolmson

Will V-boxes still be used after the war? Will paint still be packed in paper cans? Will outer pliofilm bags still be used to keep moisture away from valuable metal instruments? Will coffee go back to vacuum cans? I don't know, but most people will doubtless agree that many packages and containers will be permanently influenced by the war.

In no previous war has so much thought ever been focused on packages and containers and in no similar period of peacetime history have so many new packaging methods been developed. War at best is a sorry business, but we can at least take a cold-blooded attitude towards these packaging developments and consider which of them can be salvaged for postwar civilian use. Unquestionably a great many of these developments will persist after the war.

Under the forced draft of wartime needs and the Government's almost unlimited purchasing power, the packaging industry has developed many new containers never dreamed of before, and utilized still others that had been known but, because of their ridiculously high cost by peacetime standards, not explored. The most important thing in war is to deliver the goods, cost being secondary. For that reason, some of today's extravagant packages will unquestionably sink without trace on V-day, but there are others which will pay off on the boldness that only war could have justified.

No less important are the experiences with "substitutes" which have been forced on shippers—particularly shippers of civilian merchandise—because of wartime shortages of critical materials. In many other instances containers have been made of the old materials, but with much smaller proportions of the more critical components. Thus we have learned to produce tin cans with less tin plate than was ever thought possible, and high-test fibre containers with a minimum of new kraft pulp. Many industries have also been compelled to experiment with substitute container materials they never would have even considered in normal times. This really has been a very healthy experience, however, as nearly every such shipper now has first-hand experience with quite a long list of packaging materials. Some he will retain after the war, and in any event he has at least been forced to jettison old prejudices which may have prevented him in the past from trying all the possibilities.

Industry can also take pride in the superlative job that its specialists have accomplished in the war effort. The armed forces have been quick to grant commissions or important civilian assignments to these men, so that today the Government is finding that good packaging engineers are strictly on the critical list. After the war, these men will bring back to industry a wealth of experience and knowledge that could never otherwise have been accumulated in such a short time.

We are all familiar with the progressive "substitute steps" that have been forced on packaging. A typical series is from tin to glass with rubber gaskets, then to glass with paper closures and no rubber, and finally to paper cans or cartons treated in a variety of ways. At first paper was the universal catch-all beyond which there were no further substitutes, and for a while it seemed that there would be plenty of paper and paperboard to fall back on. But eventually even these materials became critical. Many top-priority industries have literally had to curtail production for lack of, say, corrugated or solid-fibre containers in which to deliver their merchandise.

New paper products

In spite of the sudden prosperity, the paper and paperboard industries refused to act the part of a tonnage reservoir only, and instead have developed a wide range of new products such as V-board, high wet-strength papers, grease- and moistureproof papers and other products which have often started out as substitutes, but finally have come into their own as valuable new packaging materials. Some of these are bound to persist after the war.

V-board started out as a very expensive sheet (especially in the V-1-S grade) and was difficult to manufacture, control and hold up to specifications. However, all of the producers of corrugated and solid-fibre V-board—in a remarkable, patriotic gesture—quickly perfected arrangements to pool all of their technical discoveries and improvements. This has worked out so well that today there are 30 or 40 producers of V-boxes equipped to make V1,V2,V3, as well as various grades of special weatherproof items such as $2^1/_2$-hour immersion board and board of lower test as illustrated by the TNT and 5-in-1 ration boxes. Improved technical knowledge and large-scale production experience have also resulted in the development of quite an assortment of waterproof adhesives for use in the combining process. These include urea-formaldehyde resin, polyvinyl products, asphalt and combinations of these with various starches and catalysts. Some of these newly developed compounds go under such trade names as Du Pont 77, Uformite, Bitusize and the like. In addition to that, the adhesive manufacturers have produced an array of waterproof adhesives for sealing flaps. This is all the more remarkable when it is considered that most of these adhesives are applied with a water vehicle to a board deliberately designed to resist water—yet when the adhesive has set it becomes waterproof.

Perhaps this would be a good place to define weatherproof or V-board. It is a board of relatively high Mullen test that will withstand prolonged immersion in water without disintegrating. Many people still think that

the term "weatherproof" indicates a box that will keep water away from the contents, but it cannot be emphasized too forcibly that this simply is not the case inasmuch as most weatherproof boxes have quite a hole in each corner through which water can enter. The Marine Corps favors a V-1-M box which keeps the contents dry, but in this case they use a regular weatherproof container and seal up all the seams and corners with a very high grade of pressure-sensitive tape. If it is desired to keep moisture and water away from the contents in a paper package, it is necessary to follow the method used by the Marines, or to use a heat-sealed waterproof bag inside the box, or to dip the sealed box in molten wax. It should also be pointed out that prolonged immersion of V-board injures its rigidity quite considerably, though not as much as in the case of ordinary board. As a result, V-boxes should not be depended upon to protect fragile merchandise or contents which do not completely fill the box when stacked for prolonged periods under abnormally damp conditions. Here is one problem that the war has not yet solved: the development of high wet-rigidity board. Let us hope that it will not take another war to produce this very desirable characteristic.

The fibre container industry searched for 30 years for treatment that would prevent its board from disintegrating when wet. The problem seemed difficult enough in the case of solid fibre, but it was considered absolutely impossible of solution for corrugated, since when corrugated board is immersed, the water flows into all the flutes and comes into very intimate contact with the tiny strip of adhesive along the tip of each flute. Yet today a great many box makers are producing corrugated V-board that will withstand a great deal more than 24-hour immersion in plain or salt water without any appreciable separation of the liner from the corrugations. It is therefore reasonable to suppose that after the war there will be many uses for corrugated and solid-fibre V-board, though the tonnage will not be as large as it is now. One obvious field is for export shipments where the boxes are exposed to the dampness of sea air and ship holds. Today most of the Lend-Lease V-boxes are going to Europe, but after the war it is greatly to be hoped that American business will attempt to retain a considerable portion of the South American trade we now enjoy, but which in normal times usually goes to Great Britain and Germany. Let us hope that V-boxes, because of their lighter weight and requirement of less cargo space, may contribute to our postwar business.

An incidental development in the intensive study of weatherproof containers has been the subject of tin can corrosion and its cure. This was covered very thoroughly in the December, 1943, issue of MODERN PACKAGING.

In the paper industry there have been developed dozens of new special papers to meet Government specifications, chiefly from the Ordnance Department. These papers include greaseproof, waterproof, corrosion-prevention and high wet-strength characteristics.

On the subject of export containers, we should not forget that the war has given an enormous impetus to air transport and the development of suitable containers for shipment by air. Here light weight and minimum space occupancy are the most important factors. It is true that today the greatest tonnage is moving over the Army Air Transport Command and Navy Air Transport Service. Nevertheless, when the war is over we are going to see an enormous increase in air freight. The things the Army and Navy are now learning about lightweight containers will then be available for civilian shipments.

Wax-dipped packages

Referring again to water and moistureproof containers, a very interesting development has been the small arms ammunition package first developed by the Frankford Arsenal, and the various waterproof ration packages. Prior to this war, small arms ammunition had always been packaged in soldered tin boxes. Soldering makes a questionable seal inasmuch as its entire efficiency depends upon the skill of the operator. Then when tin became critical, the Arsenal was faced with the problem of finding, if possible, a better package than the tin box. The problem was solved so completely that most of the arsenals are now using the new package and it is very questionable whether they will ever go back to the tin box. This new method of packing consists essentially of a very accurately constructed folding carton which, when sealed with waterproof glue, is practically airtight. It is then automatically passed through two baths of especially blended wax, the first bath being at a higher temperature than the second. The first immersion causes the hot wax to penetrate $^2/_3$ through the walls of the box, and the second dip in the cooler wax seals up any remaining pinholes or blowholes. Tests of the most exhaustive nature, including tumbling in the surf, have demonstrated that this package has a smaller percentage of failures than the previous one. The same method of packing has also been applied to Ration "K," 5-in-1 ration and other items. It is true that the wax is expensive, and for that reason this method of packing will not necessarily compete with tin after the war. We should not forget, however, that Cracker-Jack and some other items have been packed in this manner for many years. Another form of wax dipping that offers great possibilities for the future is the wrapping of highly polished metal parts with paper wrapped tightly around the part, after which the entire item is dipped in wax. This not only prevents corrosion under the most severe conditions, but makes the part immediately available by simply stripping off the paper. The older method was to cover the part with a heavy coating of cosmoline or other grease which took a tremendously long time to remove, particularly when applied to the intricate

mechanism of a rifle. Another method of packing such items as rifles and small mechanisms is to heat-seal them in a treated paper sleeve or bag. Beyond question these new packaging developments will persist after the war since, when the expense of degreasing the item is included, they are more economical than previous methods.

Heat-sealed pliofilm

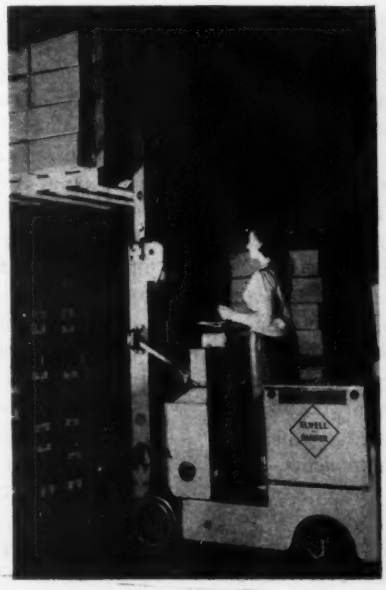
Perhaps the most spectacular package developed by the war is the laminated heat-sealed pliofilm bag which encases a complete aircraft engine, and also gives visible indication of any leaks by the change in color of a "telltale." While this aircraft engine bag may possibly be too expensive for peacetime use, this theory of protection against moisture will have many postwar applications.

Another interesting moistureproof package made of paper is the cylindrical two-piece container for artillery shells. The joint between the two pieces is sealed with waterproof pressure-sensitive tape, and almost every newspaper or magazine carries pictures of our artillery firing in foreign lands with a pile of these empty shell cases in the foreground. Here again the Government specification results in a very expensive package, but some modification of this idea is bound to have considerable use after the war. The same idea is being used on a smaller scale by the Medical Department for the packaging of field medicines and other medical equipment. In some such cases, these paper tubes are fitted with interior corrugated cushions to prevent breakage.

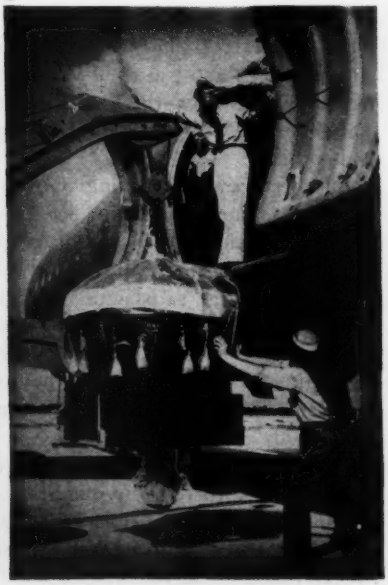
New handling methods

One of the most interesting packaging developments, due entirely to the war and undoubtedly to be adapted to postwar civilian needs, is the handling of clothing containers by the Brooklyn Naval Clothing Depot under the supervision of Capt. Chas. D. Kirk, Lt. (jg) Walter T. Sheldon and others. This is an almost perfect example of clean-cut thinking in the handling of enormous quantities of packaged clothing and other merchandise. They started out by dividing up the floor area of a box car into sections approximately 4 ft. by 4 ft. They then secured a large quantity of standard pallets each 4 ft. by 4 ft., and from that area they worked out standard lengths and widths of the containers so that they would fit exactly on this pallet. Larger size boxes were produced by increasing the top to bottom dimensions, and smaller containers were created by cutting this last dimension in halves and quarters. This means that a pallet can be loaded with an assortment of container sizes and still come out almost a perfect cube. The complete load is then metal-strapped to the pallet which means that a fork truck can pick these loads up, move them around, and stack them at almost unbelievable speeds both on the warehouse floor and in the freight car. For example, under the old method of handling containers one at a time, it often took 14 men half a day to load one car, whereas under the new system the same car can now be loaded by one operator in less than two hours. Even more significant is the fact that this operator is usually a woman. This system also means that the contractor can load and strap the pallets right in his own factory since they are carried by truck or freight car to the depot. At that point they are either put in storage or are often reconsigned to some other depot. The savings are even more impressive when it is realized that the Brooklyn depot alone often handles over 1,000,000 garments a day, and that its weekly freight traffic averages over 1,000 cars and trucks. In

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Many war-developed shipping lessons will be retained by postwar economy. 1. Palletizing, developed by the Navy, saves time and labor, can be done by women. 2. While the spectacular pliofilm bag for airplane engines may prove too expensive for peacetime use, the technique for protecting metal parts against moisture will have postwar applications.

fact, this one depot is probably the largest clothing establishment in the world today. This simple and utterly sensible method of handling freight and designing containers will simply have to be copied by civilian industry after the war if it has any hope at all of keeping up with the procession.

Government specifications

One of the most valuable assets that will accrue to civilian postwar industry is the very complete set of container specifications which the various Government branches have developed. We must admit that in the early days of the war some of the container specifications emanating from Washington were highly impractical, and even in some instances contradictory. Later, however, experienced container men were inducted into the various Government branches and they quickly produced specifications some of which are models of their kind. In the fibre container industry at least we have had very few detailed container specifications and most of these had been produced by some of the larger buyers of containers.

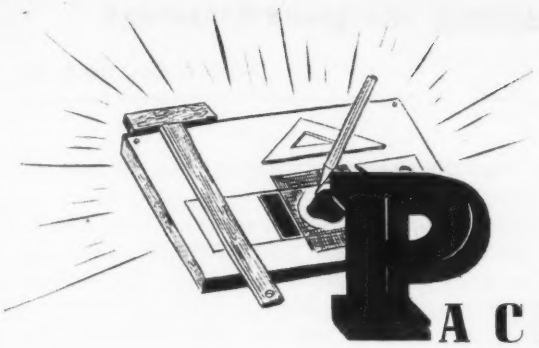
Perhaps the first and most satisfactory container specification from Washington was OQMG 93, issued by the Quartermaster Department to describe the manufacture of V-boxes. This specification has met the test of time, and today it remains a model of its kind. Not only does it give complete and accurate details covering every phase of materials and box manufacturing methods, but at the same time it omits all extraneous matter that has little or no interest to the box maker or the box user. The drawings accompanying this specification are simply perfect, and there is no excuse for anyone misconstruing any portion of this document. Proof of these statements is found in the fact that this same specification was reproduced almost literally in a great many later Government releases including the Army and Navy Manual, Army 100-14A and Navy 39P16a; the Lend-Lease Specification FSC-1742-C; the Navy Department Specification 53-B-11; the Medical Department Specification 1635-B and others.

Another very interesting Government manual is OQMG Packing Specification No. GS-1, dated December 1, 1942, covering the packaging of general supplies for the War Department. This manual is issued in loose leaf form and is very satisfactory because of the extreme brevity of each individual specification, and because at the same time nothing pertinent is omitted. One reason that this brevity is possible is that the manual was issued after many of the other fundamental specifications had already been stabilized; instead of a complete description of an individual box or its components, it was only necessary to refer by number to the one or more existing Federal specifications involved.

Another worry that container manufacturers had in the early days of the war was the fact that every Government department started issuing its own specifications; before long we had to wade through literally hundreds of them. For example, we know of one soap manufacturer who received orders for an identical brand of cake soap from the Army, the Navy and the Marine Corps. In each case, he had to pack this soap differently to meet the specific regulations involved. Fortunately, this situation did not last long, because a small group of very hard-working container specialists in WPB and other departments got busy and produced a 200-page manual which can be looked on as a sort of "master specification." This manual, which has enjoyed wide publicity and circulation, is the Army-Navy General Specicicaion for Packaging and Packing for overseas Shipment, carries number 100-14A for the Army and 39P16a for the Navy. In addition to that, the manual has also been accepted by the Department of Agriculture, the Treasury Department, the WPB, the Lend-Lease Administration, the War Shipping Administration and the ODT. This little masterpiece covers practically every form of shipping container and packing material from wooden boxes of all sorts right down to greaseproof paper and non-test corrugated board for interior packing. Beyond question it will find a permanent place in postwar civilian packaging libraries, and it is to be hoped that in those happy days the purchasers of high-test shipping containers will conform to the details of this manual rather than attempt to create their own container specification. The efficiency and economies of manufacturing containers to uniform specifications for a large list of customers are certainly great enough to warrant the time and work used in creating this manual. We all like to make fun of the Government for red tape and unnecessary use of involved phrases and clauses, but we must admit that when it comes to these latest specifications, the Government has done an excellent job.

Another valuable contribution that the Government has made to specifications is the excellent work of the Chicago Quartermaster Department. Not only has this depot produced a long list of very excellent specifications, but it operates a very comprehensive laboratory in which every point is tested and proved before it is incorporated into a written specification. Moreover, the personnel of this laboratory is very open-minded to suggestions for improvement, and seems to be glad at all times to consult with industry in order to produce a fair specification.

Thus peacetime reconversion will witness many adaptations of wartime developments in the packaging industry, and civilian goods will be better packed because of these ingenious innovations. This applies not only to such spectacular new materials as the laminated heat-sealed pliofilm now used to encase an entire airplane engine or the corrugated and solid-fibre V-boards valuable for their light weight, their strength and their space-saving qualities, but also to experiments with handling methods and package shapes.



PACKAGE PLANNING

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Blueprint for the packaging department

by C. A. Southwick, Jr.

All users of packaging materials want to know how new materials fit into their operations. They want to be sure that they are using the most economical, protective, attractive and convenient package material and form. How to secure the facts accurately, effectively and continuously is an important question today, and users will find it necessary to keep abreast of postwar packaging materials and competition if they wish to maintain a high standard of sales.

The results of brief surveys have shown that this investigation of new materials by users of packaging has been delegated to various individuals or existing departments as a secondary responsibility. Most companies appreciate the need for such research, but do not realize its nature and complexity. This activity cannot be effectively performed by any individual or department as a side line. Packaging is very complex, involving a great number of physical forms of materials and packages, many kinds and degrees of functions, and a range of equipment for forming and handling. Furthermore, packaged goods are becoming more complex and require more protection by the package. Finding the most effective package for a given product cannot be done by a jack-of-all-trades, especially not when advertising and merchandising factors must be included.

At least one person in an organization must have a sound knowledge of package and material functions, knowledge of the product, and a scientific background. Other packaging considerations can be obtained from existing personnel in other departments.

The packaging committee

The complete responsibility for package development and control should be given to a committee composed of a person from each interested department. Such a committee would have a member from, or representation by, the purchasing department, the art department, the sales department, the production department, the technical department, the advertising department and, if possible, the consumers-service department or its equivalent.

It is important to realize that in a small organization one person may represent more than one group, and in a very large company more than one person may represent each department. The important thing is to have representation of each phase governing packaging from its elements to the consumer. No decision is sound unless all factors have been considered and analyzed as to their effect on the whole.

Each member or department must have data and knowledge of packaging considerations as they affect their own operation. Also, in order to operate properly, each department will require data from other departments. The following are a few examples of what each department contributes and what each requires from the other departments.

Purchasing department—This group has knowledge of material and package costs, availability of materials and sources of samples and production needs. The purchasing department must be given specifications by the production, the technical and art departments for the materials, packages and equipment to be obtained. The purchasing department should never be allowed to buy on price alone. Competitive products can be tested and approved before purchasing.

Art department—The art department may be a part of the company, or its work may be performed by an outside designer. In either case, its scope should cover the printing and other decorative phases of packaging. It will coöperate closely with the advertising and technical departments to satisfy the needs of each.

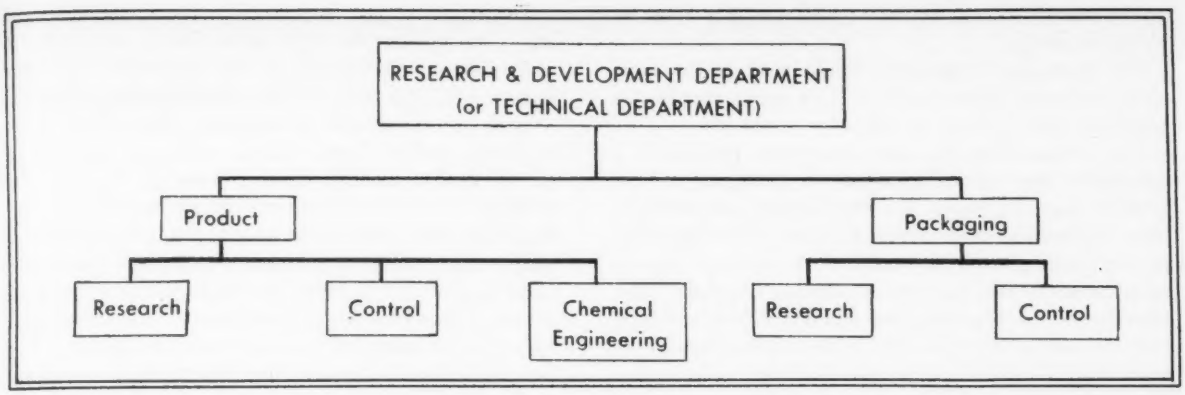
In many cases protective qualities can be combined with decorative, and these must be tested and approved by the technical group. The art department must not decide upon the package materials but must use those found suitable by the technical department. The art department should then write specifications for inks, type of printing, etc., and the grade and surface required for the purchasing department. It must also set standards of color and of quality for the guidance of the production department.

Sales department—This department supplies most of the problems as a result of its needs for new products, new packages for old products, changes in merchandising and competitive activity. It should furnish the facts on the ways and channels of merchandising, the rate of turnover, the areas of distribution, etc. The committee work is primarily to satisfy the demands and needs of this department.

Production department—This group must package the product effectively and efficiently in the equipment, form and in the materials decided upon by the committee. For its own protection, it must coöperate with the technical department to set up standards of operating characteristic and control tests. Production specifications on both materials and finished packages are important for low-cost operation, reduction of loss of materials and for uniform protective packages. This department knows the limitations and productive capacity of its existing packaging equipment—a very important factor.

The technical department and production department must coöperate closely on product changes and control, on package and material specifications, and on the control of finished and filled packages.

Advertising department—This group supplies the facts on the style and decorative phases and the package relation to other products included in the general advertising program.



Consumers-service department—Whatever the name, this group should represent the consumers' requirements and viewpoint. Problems of size, opening devices or other conveniences, how the product is used and many more questions can be presented by this department. Such data and opinions may be formed by surveys and by a consumers' kitchen. Such representation on the package committee is important and necessary, but is very often forgotten.

Technical department—It is the responsibility of this group to supply facts, data and similar objective information for the committee's consideration. To operate effectively, the technical department must have laboratory facilities and personnel assigned entirely to packaging problems. It must coöperate with the technical groups doing product research development and control, and work closely with the production and purchasing departments on specifications and control of packaging materials.

This group is necessary to indicate the materials and package forms which can be used for any package problem. Its equipment, methods and personnel should be considered with great care.

The most important single source of data and facts concerning package and material functions is this scientifically-trained group, the technical department. Depending upon the size of the company and the amount of work to be done, this department can vary in size from one person to a large staff. The important fact is that all scientific phases of packaging should be assigned to one individual, and that he be given laboratory facilities and personnel devoted entirely to packaging work. It may appear that undue emphasis has been placed on specific assignments of technical personnel to packaging problems. But this point is stressed because in too many cases packaging problems are given at random to personnel and laboratories without the special skill, experience or equipment to produce proper data and interpretations of results. Package testing requires special knowledge and facilities, and those are not present in usual laboratory set-ups. Aside from facilities, it is equally important that the technical department have some person who has had enough experience to interpret and report the laboratory findings properly so that the full benefit may be obtained from the tests.

Unquestionably these facts would be better appreciated if package testing were being done according to arbitrary and exacting standards promulgated by an official group. Until such standards are issued and in effect, we can expect package testing to be carried out with makeshift equipment, under many conditions of control and with widely varying systems of reporting results.

Certain phases of packaging can only be handled on a scientific basis, and it is unfortunate that the science of packaging has too long remained in an embryonic state. There must be a rapid appreciation of this fact if we are quickly and effectively to use the many new materials and combinations which will be available for postwar packaging. It will be impossible to evaluate the usefulness of such materials except by comparative tests skillfully made and soundly interpreted. No company can afford to ignore this fact and so allow its packages to become obsolescent and inefficient through a lack of adequate research and interpretation.

A well-staffed and equipped packaging laboratory should be responsible for a continuous flow of material- and package-test data to the packaging committee. Among these are reports on currently used packages and materials, research on new package forms and materials, testing of products for packaging characteristics.

Operation of the packaging committee

The packaging committee should be composed of one person assigned from each of these departments. It is preferable that the same person attend all meetings unless the company is so large that some departments must send different people for different groups of products. Such a situation could arise in sales or advertising, but should not happen in the production, purchasing, consumers or art departments, and must not happen in the case of the technical department. It is better to assign a permanent member from each group, and to call before the committee other persons particularly concerned with the problem at hand.

The committee should have a secretary whose duty is to report the facts and opinions presented and the final conclusion of the meetings. Obviously, as many packaging materials, designs and forms as appear practical, together with cost and production data, should be reported

to the executive group before a final decision is made by the latter group.

The packaging committee should meet at the same time each week with special or task group meeting as required. The sequence of operation could be:

The member from the sales department presents at a committee meeting the problem of packaging a new product just developed by the research department. Next, the product is described, its chemical and physical properties are given by a member of the research department called to this meeting as a special witness. The sales department then describes where and how it would like to market the product. The consumers-service member tells how the product is to be used in the home. The technical member of the committee is then assigned to get samples of the new product, find its special requirements, make package tests and recommend materials.

This assignment concludes the discussion of the new product at the committee meeting. At the next meeting, the production department presents facts on the cost of the product, the sales department tells the two sizes of packages it requires, and the consumers-service adds certain facts on home uses.

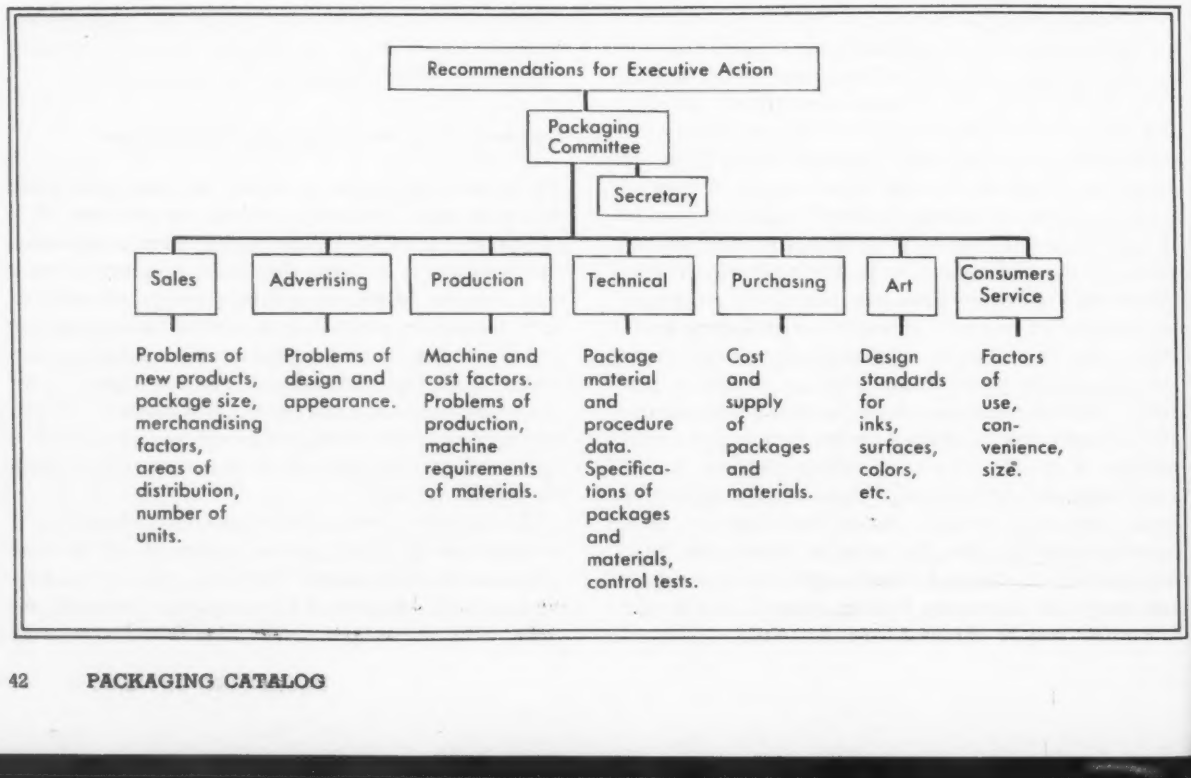
The technical department, meanwhile, has determined some of the product's characteristics, but does not have package data. At subsequent weekly meetings some additional data are accumulated, but no serious discussion occurs until the sixth meeting when the technical department presents the results of package tests. This report covers several package forms and a variety of material combinations. The sample packages have been exposed to deteriorating influences both physical and chemical. The conclusion shows certain product characteristics which allow the committee to decide upon a type of package and a level of protection best suited to the particular type of product.

The art department is given the task of color, design, etc. The production department then is assigned the task of surveying the cost of new equipment and other factors, while the technical department makes additional tests of a greater number of material combinations of the approved package form. These results are reported in six weeks (the twelfth meeting from the start of the problem). At this meeting the three best package combinations are turned over to the art department for sample in the colors and designs which have been tentatively approved. The purchasing department and production department are given tentative material specifications, both mechanical and chemical, to obtain costs. The production department also reports on the necessary equipment for production of the yearly quantity estimated by the sales department. Meanwhile, the technical department has started another series of tests for confirmation of the previous tests, so that more complete data will be available.

At the fourteenth weekly meeting, the complete report giving recommendations, designs, costs, specifications is presented for final decision by the executive group of the company. Actually, this is a rather simplified procedure, but it is a pattern for the proper sequence and operation of such a fact-finding packaging committee. Additional activities should be determined by the requirements of the individual concern.

The final decision

The final decision is made from laboratory-test data, sales and advertising requirements, cost considerations, manufacturing needs, and appearance and convenience factors. All these elements are present in every package change, and each must be weighed as objectively as possible. Here is a proved way to eliminate guesswork and do packaging in a rational manner.



Determining package functions

Once a new product has been developed, the producer must next concern himself with the proper packaging to insure its protection in transit and in storage, for if it fails to reach the consumer in a satisfactory and usable condition, it is probably doomed. The real cost of underprotection will not be apparent at the time of selection of the new package. It will only begin to announce itself later in the return of damaged goods.

Guesswork has usually been the guide in selecting packages for products basically different in composition. Or, if the new product differed only in a minor way from a commercially packaged item, imitation of that package has been the rule. In view of the engineering facts and data which can be applied to produce accurate and safe answers, neither course is necessary.

Fitting the package to the product is important now. It will be more so in our postwar period of many new developments and of many new packaging materials. The increasing complexity of postwar goods, their sensitivity and ready-for-use forms and sizes, will require better packaging than heretofore. It is axiomatic that for proper preservation, complex, finely divided, ready-for-use, small-size units require high levels of protection.

This variety of materials and package forms will make foolhardy anything but an engineering approach. Then too, the protective function must not limit or interfere with the decorative. Constant coöperation between the engineer and the artist will successfully package new products. However, the artist should never be called in before the package engineer has found the mediums on which the art work can be done.

There are three sets of essential facts which must be known and correlated before consideration can be given to the materials and packaged forms most suitable.

Product requirements

The first set of facts concerns the requirements or "packaging characteristics" of the product. Some of these data may be found from the composition or ingredients of the product or from proximate analysis. Unfortunately, however, knowledge of composition indicates only the *kind* of protection or function required.

Analytical data—For example, let us take a case where analysis shows 25 per cent of sugar (sucrose) to be present in a new product. This indicates the product probably requires protection against moisture pickup. However, knowledge of the physical state of the sugar (fineness, density, etc.), the possibility of chemical action with other ingredients (acids, salts, etc.) and the moisture level help to determine the degree of vaporproofness.

Product characteristics—While analytical data are useful, they are not so valuable or necessary as are knowledge of certain product characteristics and results of certain performance tests. Special facts to be determined are:

1. Bulk density of product
2. Abrasiveness of product
3. Mesh analysis of product

(To determine strength, durability and tightness of package and material)

4. Humidity equilibrium
5. Quantity of deteriorating element (as percentage by weight) to make product unusable or unsalable (index of failure)
6. Amount of free water
7. Percent of oil and grease (kind and melting point)
8. Chemical activity (acidity, alkalinity, etc.)
9. Percent by weight and kind of volatile ingredients

The results of the last six tests will give a complete story of what things affect the product and how fast.

Product merchandising

The next set of facts concerns the merchandising of the product: how it is stored and shipped; how long it is in the warehouse, shelf and consumer's hands; what temperature, humidity or special atmosphere the package will be exposed to; the weight of the unit package. Many of these facts cannot be determined or reported in precise terms, but general trade practices, weather data, value, consumer practices, etc., influence the results.

The combination and final analysis of these two sets of facts—product requirements and merchandising factors—will give the performance or specification requirements of the package and the package materials.

Much of the value of determining these performance specifications depends upon the judgment in interpreting and evaluating the factors of the second group, which unfortunately are not so clear cut or objective as those of group one. In the case of a new product, overpackaging is desirable and can later be adjusted with experience. But if some factors are unduly stressed, for example, extreme length of shelf-life, the performance levels will be such that only metal or glass packages will suffice.

Having established the product and merchandising requirements and reduced them to performance levels, the next step is to find as many combinations and kinds of materials in as many package forms (envelopes, bags, fibre cans, etc.) as will satisfy these demands.

Therefore, the third set of facts are those of package materials and packages of various forms and constructions. This knowledge can be obtained from suppliers, but the best and most pertinent data will be obtained from a well-equipped and staffed package testing laboratory. This laboratory, by using the new product and preparing a series of sample packages, can, in a few weeks, usually indicate preferred materials and package forms.

These facts when analyzed and reviewed with the sales, art, merchandising, production and purchasing departments should result in a final decision of package and materials guaranteeing the safety of the new product.

Coordinating function & design

by Ben S. Nash

The war introduced a new concept into packaging which means the coördination of function and design. This is a gain that will outlast the struggle and hold over as a permanent advance.

For war packaging no guesswork would do; performance is vital. No preferences of consumer, no designer's whim, no sales manager's hunches, no supplier's fetishes, no purchasing man's secret sources for getting something cheap, no useless gadgetry—none of these had any place in military packaging. The indispensable element was the protection of the product so it would be sure to reach the ultimate user in usable condition. It took a war to make of this new concept a vivid reality—and the procedure should be a guide for future package engineering methods.

In the past, one of the favorite methods of package development has been what might be called the exhaustion method, by which the final selection was arbitrarily made from a number of designs, each representative of some designer's fancy. But even before the war came, a new method was beginning to emerge. This new method was based on an analytical approach—that is, one which took into consideration every possible element that might have any bearing whatever on the final design.

This second method may quite appropriately be called package development rather than package design. Very properly, it will make full and complete use of all of the lessons learned from war packaging. It means starting out with a study of the ultimate user and the channels through which the package moves to reach that user. In the one case, the package designer must prepare a product that moves through military channels to the fighting front. In the other case, the product moves through marketing and merchandising channels to the consumer in the home. The factors in each case, the materials used, the surrounding conditions—all may differ, but the procedure and the line of reasoning are the same. From now on the old haphazard order is out. Packaging will be geared to do its maximum job.

It is quite possible that the designer, as such, may or may not be equipped to take all of the required steps himself. In fact, intelligent package development may very conceivably call for the specialized training and ability of men in a dozen different fields. By the same token, however, the designer must have a sympathetic awareness of the contributions made by every one concerned. In other words, the same amount of intensive study will be called for in future civilian packaging as has been required to do the military packaging job. The new concept may be summarized thus: "The complete study and classification of the packaging problem in its entirety precede any and all packaging development." For civilian packaging, package development starts with the outlets and the ultimate consumer, then takes all sales and marketing considerations, averages them up and makes a final packaging development judgment. The method calls for predetermination of those considerations after a scientific determination of the package functions has been arrived at. These functions have been determined by the methods of engineering and chemistry. The methods followed to arrive at marketing and consumer conclusions deal with ideas and intangible elements rather than materials, but those methods must be no less scientific. Long experience shows that there are certain basic elements in predetermining what a package should be and a package, though it appears as an entity, is the composite product of a number of these elements, all coördinated with one other. In some respects, compromises may have to be arrived at, for obviously no one individual could have the complete and final say on all of the foregoing points. In one individual, however, must rest the responsibility of reconciling divergent points of view, hence we may summarize the functions of that one individual as:

1. Determining the packaging problem. This must be accomplished through a thorough study of (a) the package user's own organization, (b) the ultimate consumer's needs, (c) the wholesale and retail channels and (d) all competitive conditions.
2. Clarifying the problem by breaking it down into a series of different specific requirements.
3. Interpreting these requirements and translating them into definite specifications.
4. Securing approval of these specifications from every department in the organization which is at all concerned with the packaging development.
5. Obtaining the best qualified agencies to devise methods of achieving the specifications.
6. Obtaining full approval of the foregoing specifications and initiating the production activity.
7. Analyzing the package as finally produced with a view to disclosing every usable sales-promotion feature.
8. "Merchandising" the final package to the manufacturer's own sales organization in such a manner as to insure marketing success.

This new concept of packaging, with its responsibilities of coördinating all points of view, means that the packaging consultant must today be much more than merely a designer of the externals. He must also take up where the technician leaves off, accepting and respecting the result's of the technician's research. He must have an understanding of the problems of the purchasing department, of the sales department and of the advertising department. He must have the ability to inspire and direct all those who are concerned with package development, and must possess the sympathetic tenacity to get things done well and in accordance with time and cost schedules.

Testing package materials

by C. A. Southwick, Jr.

First imperative for a testing method is that it be reproducible. The second is that the values reported must be a useful index of some phase of package performance. For example, if wet-strength paper has been found to fail in use as the wrapper of a damp product during a quick-freezing operation, a control method using either a bursting or a tensile test on the wet paper will make it possible to set values for the supplier which stop such failures. It is also important that the test method produce numerical results so that the data can be recorded.

It should be recognized that a test method may be a useful index of performance only to a limited degree, and that a change in the packaging material or the product can change this relationship. When this occurs, new test methods must be found which will again serve as indexes of performance. The establishment of this relationship for a package is a serious matter and it should be decided only after very complete trials and observations both in the laboratory and in the field.

Unit tests of the materials of packaging are useful as quick and sure methods of maintaining quality in both the supplier and the user plants. Material and package tests are also necessary to study production and improve quality, briefly, for research.

The number and kinds of tests needed to define a substance are determined by the complexity or functional properties of the material. While many unit tests are done at 73 deg. F. and 50 per cent R.H., it may be desirable to make some at a special temperature or humidity level. In the case of frozen products, tests should be made at 0 deg F.; for products going into the tropics, test might be made at 120 deg. F. and a humidity of about 90 per cent.

Methods of testing

In general, unit tests must be integrated with the tests on the package, the composition of the product, and the conditions and place of handling and use. Nearly anyone can follow the techniques and perform the manipulations needed to obtain test data; however, the choice of the test and the application of the result require good judgment and some depth of experience.

Material tests

Tests of mensuration—This group of tests is confined to determining the sizes of materials—briefly, dimensions and weight. Many packaging materials change their dimensions and weight with changes in the temperature and humidity of the air, but for most practical or control purposes these changes are too small to be important. However, this lack of dimensional and weight stability should not be forgotten and precise measurement must be made at standard conditions and with suitable preconditioning. The Technical Assn. of the Pulp and Paper Industry (TAPPI) method of making basis-weight and area tests should be adopted for all packaging materials. The determination of weight per unit of area is a simple matter and requires only a sample of known area and a means of weighing sufficiently sensitive to obtain an accurate value. Even though the method of making this test is simple, the method of expressing the result for papers has been confused by outmoded tradition and hallowed precedence. The paper trade practice of reporting paper as pounds per ream has become very confusing because of the varying size (area) of a ream of different types of paper, and because paper and paperboard are such an important and large part of packaging. There is a different size (area) of ream in use in each branch of the paper industry and the resulting confusion has caused many errors and losses of material. All packaging materials should be reported in terms of *pounds per 1000 sq. ft.* of area and also in *square inches per pound*. These rational and simple bases would make it easy for both the manufacturer and the user to determine and to compare cost per unit of area (i.e., yield).

While the area and weight determination on the original sample are very simple, this test gets more involved as it becomes necessary to measure the weight of the various components of a structure. For example, the determination of the components of a lacquered, one-side laminated glassine requires a very careful technique and an ingenious combination of methods. Nevertheless such data are necessary for writing an adequate physical description or specification of a packaging material. Incidentally, it is well to bear in mind that commercial materials may vary from sample to sample and perhaps more so between production lots. Such variation will be infinitesimal in dimension (area) but can be serious in weight, especially for experimental or very complex structures. However, there should be no hardship to either producer or user if the generally accepted tolerance ± 5 per cent is allowed from the specified weight.

The determination of thickness is a quick and simple test, but one which should follow the sound engineering principles as described in TAPPI methods. Specific gravity or density tests depend upon a careful measurement of volume (i.e., thickness). The values for density should be expressed as pounds per cubic foot, while the value of specific gravity is a ratio (of the density of the material to the density of water at a specified temperature) and can be expressed as a simple numerical value.

Mechanical tests—The second class of tests under the heading of "material tests" covers the most important and commonly used tests for determining certain kinds of mechanical properties. Most of these tests require specialized apparatus and rigid techniques and should be performed at the standard TAPPI conditions of temperature and humidity (73 deg. F., 50 per cent R.H.). How-

ever, control of quick tests made without atmospheric control are useful but should not be used for research or arbitration.

It is evident from the test name what property each method measures, but it does not follow that each of these properties as tested is a factor in package performance. This is true because some test methods give arbitrary values which are not directly related to any package property. Such tests are the folding endurance and flexibility tests in this group. The results of these tests are numbers which must be used in a comparative way or which are some useful index of material or package performance. Other tests in this group are bursting strength, tensile strength and tear resistance and are reported as the force or work required to burst, break or tear the sample. Such values are primary or direct indices of these properties either in the material or the package.

The other tests in this group are: elongation or degree of stretch, porosity, pressure and heat blocking, melting range and sealing strength.

Elongation or stretch is a necessary property of materials for some packaging uses. Materials which are to be stamped or similarly handled, or which may encounter quick stresses, should possess some degree of stretch. However, for some uses, the amount of elongation should be kept to a minimum because such dimensional changes during processing would affect printing register.

Porosity tests are useful for some kinds of packaging materials but of no value for materials which are heavily coated, or for transparent or plastic films. Porosity is expressed as the length of time it takes for a fixed volume of air at known pressure to pass through the sample. This test measures the freeness of a material structure in terms of air-transmission.

The determination of the pressure and heat-blocking characteristics of a material is important in storage and in machine operations. This test is performed by using two strips of a sample under a known load at a controlled temperature and a limited time.

The test for the melting point or range is a simple test which is made by techniques established by various commodity industries.

Sealing strength is important now and will become more so as stronger and more functional packages are made. The test can be made by measuring the force necessary to separate a known length of seam. The preparation of the seal, the way it is separated, the rate of pulling, and the temperature and humidity are important variables which should be standardized.

Visual properties—Gloss is the property of a material in terms of its specular reflection of light. The methods of determining its values are therefore optical, and there is much equipment for performing this operation.

The next property of materials in this group is smoothness, which can be defined as the degree of perfection of the material surface as compared to a perfect plane. This test is made by measuring the time for a given pressure of air to leak between the material and an optical plane. In other words, if the material were as smooth as the optical plane, there would be no air leakage. Smoothness is indicated (a) under no pressure, and (b) under pressure, because of the fact that in printing and certain other operations, the pressure involved can compress some materials to greater smoothness.

Transparency can be defined as the degree of clarity of a material. The material is opaque if it is like ground glass which transmits light, but through which type cannot be read; if it is like clear glass, it is transparent.

The measurement and differentiation of color is a very difficult and complex process requiring much equipment and skill. Most color tests, however, are made by comparison against standard samples or color standards. It is possible to evaluate color precisely by means of the spectrophotometer which analyzes a sample in terms of its reflection of light over the visual spectrum. With this equipment it is possible to specify color on the basis of dominant wave length, purity and visual efficiency.

Chemical tests—This group of tests is necessary to establish the protective qualities of a material in terms of



1

1. Testing of the finished package is all-important, even when the packaging materials have been carefully tested in sheet form. This new type of cabinet tests the finished package for the effects of temperature and of humidity on the container and on the product in it. The big doors here afford an airtight seal for the complete control of the temperature and humidity. Photo General Foods Corp.



2. New materials and packaging applications of new techniques must be given both mechanical and physical tests. The latter include laboratory evaluations of the ability of a package to deliver its contents in usable condition. Here the laboratory workers are checking the finish of Bonderized steel.

certain functional requirements. These functional properties of materials are also important functional properties of the finished package.

The determination of the permeability of a material to gases or liquids is actually reported and performed as the migration rate of the gases and liquids through the material. There is little difference in the apparatus or the technique for most of these tests. Actually, there is no standard method for some of these tests.

All of these tests consist of measuring either by volume or weight the quantity of active agent which passes through a sample diaphragm in a given length of time and under carefully controlled conditions of temperature, pressure and humidity.

It is also important that the absorbing means or pressure differential across the diaphragm be reported. This whole group of tests is very important and is the basis by which better and lower cost materials and packages will be made.

The remaining two tests of this group, for water penetration and for oil and grease penetration, have been standardized by TAPPI. In both these tests the results are expressed as the time in seconds for water or the test liquid to penetrate through the sample at a given temperature and humidity. The stability of a material is important in terms of its ability to retain its strength and functional properties, and also to keep its shape and weight in storage and in use. Light, heat and age affect nearly all materials to some degree. It is necessary to know the extent and rate of such changes under various conditions. Such tests usually consist of testing part of a sample for several important properties and then exposing the rest of the sample to controlled conditions of light or heat or oxygen concentration. After a suitable interval of exposure, the sample is re-tested. The difference can be reported as the percentage reduction of that property under the conditions of the test.

The test to determine the dimensional and weight stability, as to time and under various conditions of temperature and humidity, is performed in a similar manner.

The ability of a material to resist burning is important for many war uses and also a few civilian requirements. The flammability can be reported as the rate of burning of a material, or as the temperature necessary to sustain combustion, but is often expressed as a comparison with a common or standard material.

Package tests

Mechanical—The physical testing of inner conaiñers or packages has never had proper attention although work has been done on the testing of shipping cases, wood boxes, etc., by means of laboratory tumbling methods based upon rotating drums. There is no reason why similar but less rigorous techniques should not be applied to folding cartons, fibre cans, paper bags and all other package forms. Certain of the rigid types of packages could also be subjected to some type of compression test to determine their load-carrying or stacking ability. Physical tests of this kind could be carried out at both low and high humidities. The results of tests of this type, when properly correlated with tests of the package materials, would make it possible to establish workable indexes of many of the material tests. Also such data could be used in writing performance specifications and would be useful in a research program on the factors contributing to package strength.

Chemical—Laboratory evaluation of ability of a package to deliver contents in usable condition, depends upon test methods which use controlled atmospheres. These atmospheres are selected so as to simulate severe storage conditions and will give final results in a relatively short time. The degree of acceleration depends on the product, the packaging materials, the type of storage, exposure, and the approximate location of the marketing area. Each of these phases must be known and the final

answers will determine how much the storage of samples can be accelerated. For example, paraffin wax is an important part of many packages and a material of established usefulness. It is obvious that the temperature of a test cabinet should not be high enough to melt or affect the physical condition of the package as such a change obviously affects the protection. Also certain products can be preserved only below a given temperature. Thus it would be unfortunate to test frozen food packages at a temperature above their melting point.

For most products, the raising of the temperature and the humidity at a very high or low degree of saturation is a proved reproducible means of obtaining valuable and sound data on package performance in the laboratory. In fact, data from such tests alone, if intelligently used, are sufficient to determine the most effective package. One or two rooms or cabinets properly constructed, controlled and operated, form a scientific basis for package evaluation as compared to the method of field trial. The field trial is expensive, long, not reproducible and may be misleading because of unusual weather.

For products to be sold from the open shelves of retail stores in continental United States, a temperature of 100° F. or 37.8° C. has proved to be entirely satisfactory. If the product is hygroscopic or dry, or can be deteriorated by excessive moisture, then the humidity level should be held at 90 per cent R.H. For products which carry a high moisture level or which can be spoiled by becoming dry, the moisture content of the air should be kept at about 40 per cent R.H. Products which are to be shipped into or through the tropics might better be tested at 120° F., using the same levels of humidity.

The construction and control of good package testing cabinets or rooms is more difficult and expensive than most people realize. Any apparatus controlling humidity must be designed and built by competent engineers. Home-made units and those converted from refrigerators and ovens are short-lived expedients which require constant attention and invariably spoil valuable samples. A properly designed cabinet should not cause precipitation of moisture on the packages at any time, since water is not a hazard in commercial practice with goods sold from open shelves. Also the air velocity around the packages should be very low. These two requirements, plus the fact that at 100° F. and 90 per cent R.H., water vapor has a pressure about 9 oz. per square inch greater than normal atmosphere, show some of the problems in cabinet construction. Package testing equipment bought from an experienced maker, together with good control instruments and materials, gives the most in satisfaction.

There are two other points which always come up in discussing package-testing equipment. One is whether to use a cabinet of volumes up to about 60 cubic feet, or a room of much larger volume. This is a matter of cost, space and volume of samples since either type can be made to operate at the same conditions. A room should not be built merely to give space for someone to weigh and inspect the samples as this can be done much more comfortably and efficiently elsewhere, especially if the test atmosphere is held at 100° F. and 90 per cent R.H. For all practical purposes except in case of a large volume of samples, the cabinet is much easier to operate and much lower in cost.

The remaining point is whether a testing atmosphere should be held at a fixed value of temperature and humidity or should uniformly vary these conditions by means of a predetermined cycle. Control equipment has been on the market which makes possible any variation of temperature and humidity in the cycle and any number of complete cycles per 24 hours. There are some limits on the possible rate of change of temperature because of the danger of precipitation of water and also because of the heat capacity of the "load" in the chamber. A chamber having such a cyclic controller is very expensive and difficult to build and if not used with great discretion can give very misleading and valueless data. The main reason advanced for the need of a cyclic chamber is that it simulates the changes of temperature and humidity of day and night.

However, packages spend part of their life in warehouses where little temperature change occurs and the rest of their life on shelves in stores or homes, where temperature and humidity changes are less than occur in the outside air. A cyclic controlled chamber is not advised or necessary but if available should not be operated through more than two cycles per 24 hours, and temperature and humidity changes should be kept small.

All products show some change in state or composition in the process of deterioration with age and the proper choice of the means of following breakdown can simplify the work and insure the accuracy of the final conclusions. For example, one means of measuring the condition of baking powder is by measuring the CO_2 content but unfortunately this product is well on the way to complete spoilage before CO_2 loss occurs in a package test. Since CO_2 release can only occur when baking powder goes above a certain moisture content, the simplest index of the protection given by the package is the amount of moisture picked up by the powder.

Products which contain fat or oils could be examined for increase in oxygen absorbed, but some types of packages may show oil stain and become unsalable before product deterioration is effected. Fortunately, most products and packages can be tested for gain or loss of moisture content and this simplifies both the procedure and the supplementary equipment needed. On this basis not less than a dozen packages of each kind are filled from a well-mixed batch of typical product. Both product and packages should be the best possible approximation of commercial practice.

Each package should then be indelibly coded and weighed on a gram balance to the nearest $^1/_{10}$ gram. They are then placed in an atmosphere which will cause a large change in moisture content. Each package is quickly weighed in the same manner at the same time each day or week or whatever interval gives an easily weighable difference. After a short time the packaging materials come to moisture equilibrium and after that the weight change of the package usually follows a uniform rate and all of the weight change represents moisture gained or lost by the product. Very rarely is a

product encountered which has enough loss of volatile matter or gain by oxidation to affect the accuracy of this method. Such products must be tested by a technique based on these extraordinary constituents. In every case the testing time should be long enough to render either the package unsalable or the product unusable.

The index of the protective qualities of each package type is the average weight change of the packages for a given period after arriving at a uniform rate of weight change. This method of using gross package weight changes as an index of performance is criticized by those who prefer to follow the change in the actual moisture content of the product. The method of following changes in the moisture content requires much more care in preparation of uniform samples for analysis and much more labor, time and extra equipment. Although, the method produces excellent results if carefully followed, as a check the method of gross weighing should also be performed on the same samples.

Penetration or absorption of grease or water into package materials produces discoloration or softening.

A simple test method is to store the samples until the package becomes unsalable or unusable. In these cases there is no need to weigh the samples and comparisons can be made on the basis of the time required to show failure. Either grease or water in a product *must* be held by that part of a package which is in contact with the product (i.e., the liner or lining surface).

Flavor loss can best be measured by taste and smell tests before and after being exposed to storage.

It is advisable to hold control samples at low temperature so that direct comparisons can be made after various intervals of storage.

The testing of packages for their penetration of, or deterioration by, various gases is an obscure and little publicized subject. War gases appear to render unusable all fibre packages but the test methods have not been outlined or standardized.

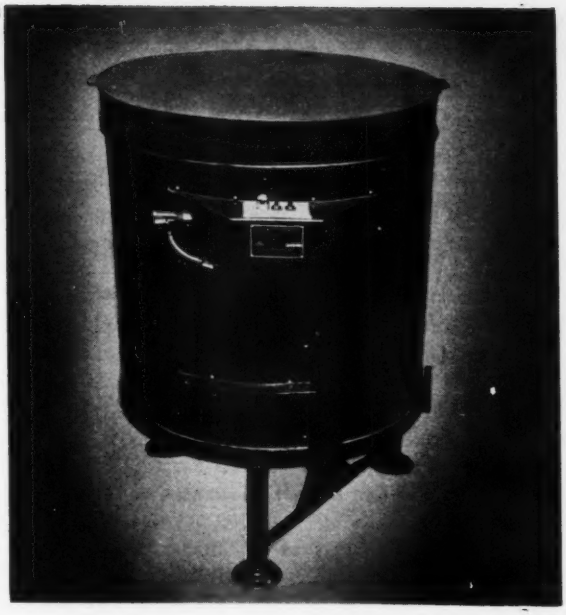
Conclusions

The degree of usefulness of any material test is determined by whether or not it is a good index of some phase of package performance. Many material tests are of limited usefulness in the final evaluation of a package.

Packaging tests are the means of evaluating package forms, types and combinations, in terms of their functional properties and future performance under severe conditions. They are best performed when using an atmosphere of controlled temperature and humidity at levels which cause deterioration of product or package.

Recommended atmospheres are: 100° F. 90 per cent R.H. for hygroscopic products, 100° F. 40 per cent R.H. for products with high moisture levels; frozen foods 0° F. low humidity. These conditions provide acceleration of the test without change of state of most products or any practical packaging material. There is no need for cyclic control of atmosphere, which must be used with discretion. Simplest technique uses weight-change of filled package over a period of constant rate of gain. This value becomes an index of package performance.

3



3. Usually the testing cabinet serves as well as the larger testing room. This cabinet for testing moisture-vapor transmission contains an electric heating coil to warm the moist air which, impelled by a fan, surrounds test samples of materials. Photo Package Material Labs.

Package and Materials Testing*

Material Tests

A. Mensuration
1. Area
2. Weight per unit of area
   (a) of base
   (b) of added material
3. Caliper or thickness
4. Specific gravity or density

B. Mechanical
1. Bursting
2. Tensile
3. Tear
4. Fold
5. Flexibility
6. Elongation
7. Porosity
8. Pressure and heat blocking
9. Melting range
10. Sealing strength

C. Visual
1. Gloss
2. Smoothness
   (a) no pressure
   (b) under pressure
3. Opacity
4. Transparency
5. Color

D. Chemical
1. Air and fixed gases
2. Water
   (a) absorption
   (b) penetration
3. Water vapor
4. Oils and greases
5. Organic vapor
6. Resistance to special agents
   (a) war gases
   (b) solvents
   (c) acids, alkalies and chemicals
7. Stability
   (a) effect of light, heat and age
   (b) dimensional and weight
8. Flammability

Package Tests

A. Mechanical
1. Mechanical
2. Tumbling and drop

B. Chemical
1. Moisture migration
2. Grease penetration
3. Flavor loss
4. Water
5. War gases
6. Oxygen and other fixed gases

* These represent some of the more important types of tests. As a result of them, good material specifications could be written. Some materials require all tests, others those which outline their properties.

Hazards encountered by packages

by Dr. E. C. Merrill

The objective in this discussion is to cover briefly some of the numerous influences and factors concerning manufacturers and distributors interested in the successful protection of merchandise.

Too often, perhaps, have many of us experienced instances where an apparently simple problem in packaging and protection has turned out to be somewhat more complicated than it was originally considered to be. Because of this, and especially during these hectic days of shortages, substitutes and alternate materials, it seems appropriate to emphasize certain hazards which are known, but of which many persons are not thoroughly conscious.

Primary considerations of specific problems will of course involve:

1. Nature of merchandise
   - a Perishable
   - b Normally stable
2. Expected shelf-life
3. Area of distribution
   - a Local
   - b National
   - c Foreign

Since there are so many factors to be taken into account in the possible use of packages made of the new alternate materials presented today, one must of necessity consider all conditions that may have an influence in the problem of determining the suitability to the case at hand of the materials under consideration.

Undoubtedly one of the most common considerations is the protection required against moisture, so important these days not only in closures and liners for bottles, but as well in numerous metal substitutes for packaging described as moisture resistant. While certain technical information may be afforded by the suppliers of materials as to the moisture-vapor permeability of these products, it does not necessarily follow that such material, when used commercially in the package in question, may be wholly relied upon to be as efficient as the tests indicate. I have in mind the case of protective films, laminated products of cellulosic material and numerous classes of sheet materials that may or may not stand up under the fabricating and flexing operations that occur to the manufactured product. Hence the desirability of the practical test for moisture resistance in the final finished form under various extremes of heat and cold and high humidities.

But in considering the factors that decide the suitability of package materials, we must look broadly at the complexity of influencing factors which may work individually, or in combination with one another, as different conditions may arise in the varying geographical and climatic areas to which goods are shipped.

Of these influences may be mentioned:

1. Heat
2. Moisture or humidity
3. Cold
4. Extreme dryness
5. Light
6. Vibration
7. Bacterial action
8. Moulds
9. Insects
10. Dust
11. Atmospheric action, such as SO_2 in the air of some cities during winter months
12. Chemical action
    - a With impairment of content by container
    - b With impairment of container by content
    - c With impairment of container and contents
13. Permeability of odorous materials contained in package, with impairment of content
14. Migration of volatiles from within, with impairment of lithography and printing on package
15. Shuck in handling operations
16. Barometric pressure
17. Combination of one or more of above influences

While it is true that certain of the above-mentioned considerations may be extremes of remote possibility, these influences might, nonetheless, manifest themselves under certain circumstances.

For example, we have numerous cases in the field of medicinal products where the effects of heat and cold produce the so-called "breathing effect" in containers and packages of a non-hermetic type. This effect is markedly accentuated by variable barometric pressures. Merchandise shipped from low to high altitudes undergoes an even more pronounced breathing effect, or if the container is hermetic and unable to withstand the internal pressure created at high altitudes, it will blow out from within.

Since the postwar period will unquestionably develop considerably more express and freight shipment by airplane, greater consideration of the wide changes in atmospheric pressure inevitable to air travel is necessary.

In the field of such pharmaceutical products as are listed in the *United States Pharmacopoeia*, it has been found desirable, in the case of certain products that are peculiarly susceptible to light, to specify the use of light-resistant containers defined in the USP as: "a container which is opaque or designed to prevent photochemical deterioration of the contents beyond the official limits of strength, quality, or purity under customary conditions of handling, storage, shipment, or sale."

In the field of vitamin products especially, a greater consciousness on the part of manufacturers of such preparations concerning the deteriorative effect of light has

become apparent, and for this reason protection in this direction is being emphasized.

Such changes as are effected by strong light and sunlight ranging from fading of color to spoilage of numerous food products of an oily nature, are too well known to amplify, but since most chemical changes are accelerated by the presence of light and heat, it becomes obvious that protection against their influence is to be seriously considered.

Light, heat and moisture in combination are undoubtedly the most common everyday hazard for a wide range of different classes of merchandise.

Some bottles may, under test, appear perfectly to contain a liquid under normal conditions, but when holding volatile material, such as alcohol or even water, losses may occur at higher temperatures due to increased vapor pressures.

The factor of insect penetration is often overlooked in developing what might otherwise be an ideal package for the particular product. Especially in the case of merchandise for national distribution, we must consider the varieties of beetles and other insects capable of drilling into a package of material attractive to them. It is not surprising that their influence is one for serious consideration. Food products especially, and even certain pharmaceutical and medicinal products, are vulnerable to their attacks.

In the case of liners for closures of bottles which often are made of chemically active materials, it may be found necessary to determine if there is any reaction, if there is impairment of contents or closure material.

Again we have these destructive agents ever present to exert their influence, especially under conditions of warmth and humidity favorable to their growth. How often we have seen their effect, not only on the contents of merchandise, but even on the packaging material.

Often a protective material may ultimately be found defective with respect to some component in its manufacture impossible to identify by chemical test, and yet sufficiently active to contribute an "off taste" or an "off flavor or odor" to the contents of the package.

In the foregoing, therefore, we have a brief summary of some of the more common influences that are everyday hazards in the packaging of various classes of commodities. These might be conditions that might obtain in individual cases. But what does this all boil down to?

For many years the conservative manufacturer proceeded along the lines of fundamental common sense. It has not been an uncommon occurrence for manufacturers of nationally distributed goods to subject their merchandise to tests in extremes of shipping and transportation to zones of high and low temperatures and high and low humidities; to transportation handling that tests not only the effect of vibration, but the strength and durability of the package.

Beyond this, some manufacturers have subjected merchandise to trial sale in different zones of distribution before any advertising program is adopted, so that they may learn suitability and stability of the product in its complete dress and under the variables of influence that would affect the product up to the final sale.

Such a procedure seems most logical and commendable since it includes the over-all exposure of the package and its contents to the complexity of conditions that may arise in the expected distribution and sale of the merchandise. This includes time and shelf-life factors.

In these days, of course, time is a factor of importance in the development of new products and packages, and the testing laboratory can make accelerated tests on the package in its complete dress that will go a long way in predetermining the probable suitability of the package to the product and its market.



All of the physical and chemical hazards encountered by packages have been taken into consideration by the Army Medical Corps in developing their excellent containers, among the best examples of our current scientific packaging.

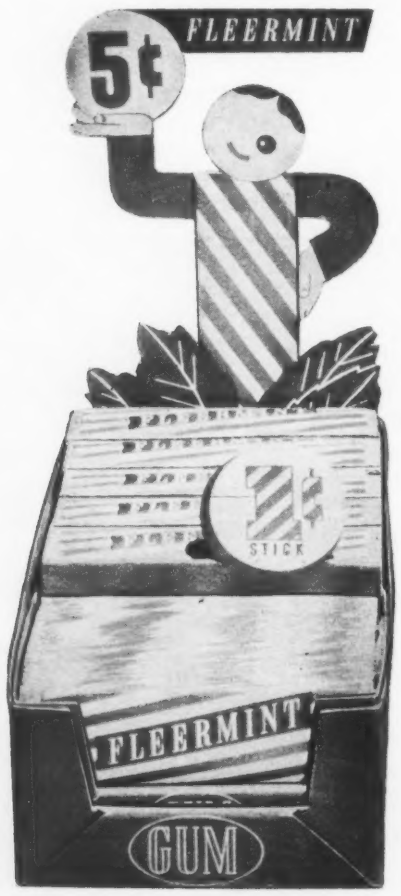
Postwar design in work

by Raymond Loewy

Because the term "postwar" has been applied recklessly to a variety of impractical design fancies, it should be used advisedly in connection with package design. There is nothing either impractical or remote about postwar package design. In relation to time, postwar packaging is the business of today; as for flights of fancy, the package designer is too busy to indulge in them. At the moment, however, one legitimate connotation has been added to the word "postwar," and that is "confidential." Specific plans are being guarded as jealously as war secrets, which they are in fact to the manufacturer who has taken the time and expense to evolve them.

For the past two years, the designer's report to the packaging industry has boiled down to discussions of expediency—the substitution of materials, the development of potentially useful techniques, etc. Today's report reveals that the period of designing emergency packages is tapering off. With eye to the future and nose to the drafting board, preparations are being made for the resumption of better-than-normal packaging programs.

1. To be continued after the war though designed in 1942 is this wartime package and display for Fleermint gum.



1

Much will be salvaged from war packaging methods that will benefit the industry, but the temptation to overestimate the number of valuable lessons learned and techniques accumulated must be resisted. Try as we may to find virtue in some wartime expedients, some will be sloughed off with the emergency that necessitated them, and no tears shed. What we have learned that is good is already being applied to peacetime design.

Packaging under war conditions, if it produced no other benefit, has broken down many a manufacturer's innate resistance to change. True, emergency packaging brought this about the "hard way," but the break having been made, many products will emerge in improved costume after the war. More than this, a great many hitherto unpackaged items are being treated. The fact that sales might be affected by unfamiliar packages for established products has been a manufacturer's chief argument against modernizing his package. Change in itself is not an unmitigated virtue, unless it is change for the better. There will be a great many manufacturers who can return without apology to prewar packages, providing machinery is available and other economic considerations justify the resumption of prewar production methods.

While the exact number of packaging techniques which might be considered improvements of the past two years is debatable, there can be no question about some. Particularly in the case of prepacking complicated tools, machinery or other durable goods, great strides have been taken. Food packaging for overseas shipment added much to sound packaging practice. In these instances representing only two of many, the war provided a vast laboratory for testing deficiencies in packing techniques under extreme conditions. Overpackaging and underprotection were major evils when shipping space was limited and costly. The designer, with new products to package and familiar products to launch again, will make use of every device that war packaging has developed through scientific tests and has used successfully.

Perhaps the most conspicuous new feature of the postwar packaging field at the moment is the increase in its size and scope. As never before, manufacturers are design-conscious. They expect markets to be expanded; there are new competitors in every field; products which were never packaged before are being prepared for sale the world over. Transportation facilities having been increased, merchandising assumes international proportions in scope.

The American military has opened many new markets abroad; new tastes are being developed in countries which never before had access to American-made products. Packages with limited regional appeal are ruled

out of these markets. Design of universal appeal must replace them.

By the utilization of the techniques, materials—and there have been some—and the psychological advantages that war has produced, the designer's work for postwar packaging continues in the direction of eliminating old evils. Most prevalent of these has been overpacking—the whimsical American practice of putting powder into a metal container, wrapping this in cellophane, placing it in an outer container of cardboard, wrapping this and successively labeling each. In this not-too-exaggerated instance, both overpackaging and overprotection find example. In order to make a package appealing and economical, the designer must know exactly where to call a stop. Overpackaging, over- or underprotection, the use of too much strong color, overinsistence on legibility at the cost of attractiveness—all are forms of excess which careful package design attempts to prevent.

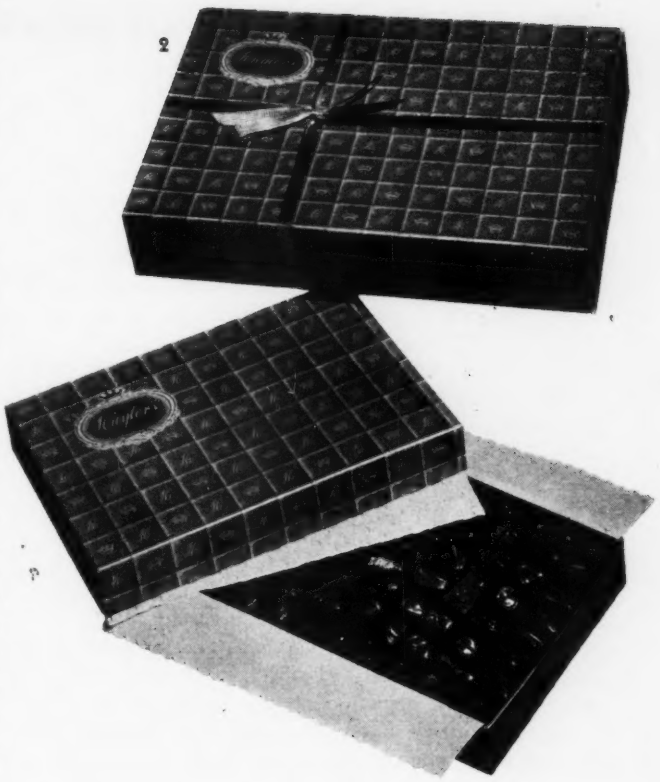
Beginning again after the war, package design will be dedicated to making a product as attractive at the point-of-sale as it is at the point-of-use, or vice versa. For example, it has been seen that often the color of a liquid in a bottle is its most attractive feature. Concealing this bottle, then, in a container, eliminates a potential selling feature. Unless the outer container is necessary in shipping or for protection, it would seem that the unnecessary expense of overpackaging is not justified. Conversely, the talent of a designer may be lavished on an exterior carton which, at the point-of-use, would be thrown away and an inferior inside container revealed. In this case, the customer may think twice before being taken in by the glamorous outer face of the product on his storekeeper's shelves. Bad planning in both cases can be blamed.

Simply because the wartime customer has had to buy packages with a minimum of appeal does not mean that he likes them always. There are exceptions: in some few cases a war-baby has proved itself far superior to its peacetime predecessor, and will remain on the market in peacetime. Postwar packages, within the bounds of good taste, are going to be designed to satisfy the aesthetic sense as never before.

The use of color is pertinent in any discussion of appeal. There is a trend towards the use of more subtle color, now that strong colors have begun to scream at one another from too many counters and shelves. Particularly in the cosmetic and semi-cosmetic field, it is doubtful whether the package that "sells" in orange and black will suit the color scheme in the home. On the shelf, too, a quiet color scheme among many strong combinations of color will be conspicuous by contrast, and therefore, a definite selling advantage may be established.

Another advertising "must"—legibility—can be satisfied without sacrificing everything to it. There has been a tendency to overemphasize the legibility of a trade name; it is up to the designer to determine where reasonable legibility ends and strident advertising begins, and to remain within the limits of good form.

I believe that the retail customer is going to be sensitive to beauty in packages as a direct reaction to war



2. A coördinated merchandising plan with an eye to wartime adaptations, produced this Huyler's candy box in 1942.

packaging. He will be a sophisticate in so far as minimum packaging is concerned also. It is doubtful that he can ever be fooled into thinking that packaging must add appreciably to the cost of his product. After all, he has accepted the wartime package with no reduction in the retail price in most cases, and he knows that, even allowing for fluctuating economic conditions, he can demand excellent design and efficient packaging without being taxed heavily for these.

From a period when the designer was called upon to make bricks without straws, he now progresses to a period when all things are imminently available. The best check upon him, if he needs one, will be the consumer. Without the opportunity now for consumer test, the designer must predict, as best he may, what will be acceptable and popular. As in other fields, there are as many guesses about public acceptance and expectancy as there are manufacturers—more, if the armchair theorists are to be included. With so many opinions about "what the public wants," the designer must steer a sober course in the work he is doing now. If, however, the lessons that war has taught are added to basic design principles, there is reason to hope that packaging will show as much advancement as in any comparable period of normal peacetime development—if not more, since these lessons were learned under the most trying and exacting conditions in which any designer might hope to have his theories tested.

Market testing of package designs

by Samuel G. Barton

The manufacturer who wishes to plan a full-scale professional package design study should really begin with the consumer—consider how the package would be designed if Mrs. Average Consumer herself should retain an eminent designer to outline the specifications for the ideal package with no consideration whatsoever for the problems of the manufacturer.

With such specifications at hand, packaging engineers could be consulted, technicians would eliminate the impractical factors and probably approve two or three basic types—each type representing a practical compromise of the housewife's original set of plans. Next, a good designer could furnish two or three alternate designs which would stand out on retailers' shelves.

This done, the designs should be taken into the field. Find out where the product will be exhibited in big stores and little ones, how it will stand out among its competitors. Take designs that will attract, and conduct two consumer tests, the first for design preference—the offhand opinion of the consumer—the second, a consumer use test. Analyze consumer preferences according to economic class, age and the rate of consumption of this type of product. Be sure you award the decision to the package preferred by the people who represent your primary market—the persons who make the decision as to the final purchase in the families that are the heavy buyers.

From the consumer's standpoint, protection is the primary function of the package—the protection of the chemical composition, the appearance, the protection against loss by leakage and against the many other hazards which packages may encounter.

The consumer may want to know what you do to protect your product on its way to the display room, and this may be an important part of the sales story. Of more direct importance to the consumer, however, is the protection given the product after it leaves the display—during transportation to the place where it is to be consumed or used, while it is stored before being used, and while it is in use.

The question of how long the package must stay in the home is an important one for the manufacturer to answer, for obviously all families and all people will not consume a product at the same rate during all seasons of the year and different localities will make different demands. The packager must take the severest conditions into consideration: bugs, excess humidity, heat, rust, evaporation, color fading, etc. I would suggest the assistance of a professional research staff where this phase is of major importance, but feel that a little consumer investigation by your own staff may help to check your own ideas of consumption rates for your present or postwar products. When you have obtained some valid concept of the protection conditions your package must meet, these conditions can be approximated by a competent testing laboratory.

Next come actual consumer tests of two or more packages approved by the laboratory. Ask consumers to use the products for a period of time—many will do it as a favor, more in return for "free merchandise." The best test obtains a comparison of two or more packages by each tester, with tests either running concurrently in the same home or with the tester fully advised that a second or third package is to be tested later and comparisons requested. We have found it better to use a smaller panel of testers but to compensate each one in addition to the "free merchandise" she is to test. If she is paid, she realizes that the test is a sincere one.

This rather specialized function is important for many products, among them milk, carbonated beverages, salt, disposable tissues, catsup, dentifrices, cigarettes, cold cereals. The package must not only protect, but must



1

1. Three factors which can be stressed in the design of a package are the brand name, the product itself, or information about the grade or the uses of the product. Many designers incorporate two or more of these points in their packages.



2. (Left) Trademark and brand name are emphasized on Heinz cans. Reverse of this package contains instructions, but it again stresses the family name. (Right) Tempting color illustration of tomatoes covers about ⅔ of the space on this label. Grade and quantity information occupy remainder.

work satisfactorily and continue to function during its life. Consumer testing of the package will help you to avoid an impractical dispensing package and help you in the decision of whether to favor appearance or practicability in a compromise.

Some of the most obvious points to be considered are that the package be small enough to be stored easily in the average home, small enough for the housewife to carry with her other purchases, small enough to fit the amount of money that the consumer can lay out from a weekly paycheck. At the same time it must be large enough to be economically packaged, *sized to fit the customary shopping frequency pattern and the normal consumption rate*, and small enough (or protective enough) to avoid waste through spoilage.

With more and more business being transacted by self-service, it is essential that the package clearly announce the type of product it contains. A box containing crackers should be plainly labeled. The buyer must be reminded to buy crackers first—your particular brand second.

A well-identified brand assists the buyer either in remembering "that's the one I want," or, "that's the brand I'll never buy again." Family brand identification can be aided through package design by color, type styles and package shapes. See to it that your new package can be recognized by the consumer as a member of your brand family. Find out if your new package creates a deep and clear impression—a picture of the label that the consumer can easily visualize in his mind's eye. The relative ability of several packages to do this can be estimated through simple comparison interviews with a small cross section of the customers and a careful analysis of their reactions.

Certainly a great part of its selling job is done if the package design clearly identifies both the commodity and the brand.

But it can also stimulate a desire to buy regardless of real need for the product—especially if the package is a dispensing device. Another important factor, which can be developed tremendously in the postwar to create brand loyalty and perhaps to step up consumption rate, is the secondary use of the package—for example, the beverage glasses in which jelly, cheese and luncheon spreads are packaged.

The package itself can sell the ideas of quality, sanitation, purity, etc., and its ability to do so can be tested through consumer interviewing.

A package can frequently sell if, through use of pictures, menus, recipes or suggestions on the label, it can answer such questions as "What should I get for dinner tonight?", "What should I get Amy as a gift for Valentine's Day?"

Closely allied with the idea of selling by providing menus, recipes, etc., is the function of basic instruction in the use of product and package. Research has revealed that few are properly written or illustrated, that most are never read at all, that people still break the turn keys of fish tins, open cracker boxes at the wrong end. The use of good diagrams or pictures supplemented by short visible copy has been found best.

Instruction can be easily tested, but requires that a cross section of potential consumers make the test. The investigator notes the testers' mistakes in following directions, discusses the directions with the tester to find out where they are unclear.

The informative label on a package should report the facts—but they must be understood. This can be facilitated through testing the wording, but may well require supplemental education through a campaign of general advertising.

Most manufacturers would do well to know more about the facilities which consumers have for storing his commodities. What proportion of the users of his com-



3

3. The very most is made of the label space in this package. On the front, trade name and product are equally stressed, Government-required information is given. Colorfully illustrated recipes on the back and one side of the can suggest many uses. Remaining side gives manufacturer's name, while the top advertises another product of the same packer.

modities would find it inconvenient to store a package 8 in. high? 9 in.? 11 in.? For some products it would be well to know, along with the average consumer storage facilities, the range of average humidity and temperature in consumer storage cabinets as well as possible hazards due to discrepancies in equipment.

Many large corporations have extensive research staffs and budget as much or more for market research as they do for product research—and many flagrant marketing and packaging errors are thus avoided.

Every manufacturer should have a consumer research department—if necessary, it can start out as a one-man affair. A good basic research unit would: (1) collect, analyze and digest outside research studies; (2) abstract pertinent data; (3) represent the consumer's point of view in any management meeting; (4) conduct small-scale field surveys where a few hundred local consumer interviews would assist in answering the marketing problem—protection against any flagrant marketing or packaging errors; (5) plan, pretest and direct full-scale professional surveys; (6) analyze and interpret the results of any continuing research services to which the company might subscribe.

Including the services of a $5000 to $10,000 a year research director, a librarian-secretary, a statistician-chartist, two interviewer clerks and operating expenses, the annual budget for such a basic research department would range from $11,500 to $18,800. Such a department, if staffed with versatile people, could handle practically any type of general market research problem as well as the specialized ones of package design research, even though it might not be able to undertake full-scale research studies.

When a major problem is known or suspected to exist which might be solved through research, a field study is indicated. After preliminary studies and checking for previous data on similar problems, it can be determined whether a small-scale study or a full-scale regional or national survey is necessary. It may develop that the problem can best be handled through the use of some of the specialized research techniques—consumer jury, test store audits or consumer panels.

Having determined that the problem requires professional research agency assistance, two or more such agencies should be called in for discussion of the problem, paid a flat fee for consultation and for making their recommendations as to methods, procedures, questionnaire forms, etc. When full specifications for the study have been drawn up, bids should be asked for, and such bids should be based on an assumed average production rate, with the cost being increased or decreased in the event that the actual survey should have a lower or higher production rate when extended to a national basis. When the basis is uniformly understood by all concerned, such bidding is eminently fair both to the manufacturer and to the research agency.

Important to look for in a search agency are a research director experienced in previous studies of the type required on your problem, a permanent staff of field supervisors in major markets, salaried staff of interviewers, permanent staff of coders and editors, staff and facilities for manual and mechanical (punched card) tabulating, and one or more highly trained mathematical statisticians.

Having selected the research agency, there should be a full discussion of the projected form of the final report and of the methods of application of potential findings. Dummy tables and charts should be prepared to avoid opportunities for misunderstandings, to force all of the decisions that are better made before than after the field work and tabulation have started. Every table and chart is set up except for the final figures to be inserted when the field work is completed. After the survey is completed, new factors, requiring special analysis, are handled quite easily.

Necessarily, much of the discussion of research on package design applies as well to product testing and to consumer research in general. It is my suggestion, therefore, that if your company is not at present so equipped, you should now make plans for the addition of a basic consumer research staff so that, both during the war period and for the postwar, you may take full advantage of research as a substitute for guesswork.



STANDARDS FOR COLOR IDE

American Colorist: Designed by Faber Birren and widely used in horticulture, art and industry. Charts contain over 500 samples. (One of the most inexpensive color systems ever published.) The Crimson Press, Westport, Conn.

American Standards Association: An important recent standard for color identification is that issued by American Standards Association, New York, *Specification and Description of Color*, Z44-1942. Approved by a number of associations and manufacturers, it recommends the use of the Recording Spectrophotometer, the Munsell System, and the Inter-Society Color Council method of designation.

Artists' Oil Paints: Minimum standards to assure satisfactory color, working qualities and permanence in oil paints used by artists. Adapted by a conference of manufacturers, distributors and users. Commercial Standard, CS98-42, U. S. Department of Commerce, National Bureau of Standards, Washington.

Bathroom Accessories: A group of 7 colors for bathroom accessories: white, bath green, orchid, ivory, maize, bath blue, royal blue. Accepted by the National Retail Dry Goods Assn. and approved by a conference of manufacturers, distributors and users. Commercial Standard, CS63-38, U. S. Department of Commerce, National Bureau of Standards, Washington.

Baumann Color Guide: A card index system containing over 1,300 standards, with extra booklet containing duplicate samples in smaller size. Original edition was in German, although English translations have been made. (Current source of distribution unknown.)

British Colour Council: A dictionary of 180 samples of dyed silk, used and accepted by British industry to standardize color names. Published in London.

Camouflage Colors: A series of nine colors used as standards by the Army. Specification T-1213, Supplement A and B, U. S. Army, Corps of Engineers, Washington.

Cast Stone: A group of 14 colors for the finish of cast stone. Recommended Commercial Standard, TS-2126, U. S. Department of Commerce, National Bureau of Standards, Washington.

Color Kit: Designed by Faber Birren. Color identification is achieved through the use of disks and a mechanical spinning device. Numerical proportions are developed for all notations. The Crimson Press, Westport, Conn.

Dictionary of Color: Written by A. Maerz and M. Rea Paul. Shows over 7000 samples, with color names based on historical origins and current usage. Published by McGraw-Hill Book Co., New York.

Drugs: U. S. Pharmacopoeia and the National Formulary designate the colors of drugs by name in their monographs. The National Formulary uses the ISCC-NBS system of color designations and about one-third of the monographs in the current issue of the *U. S. Pharmacopoeia* uses them. Work is planned which will put the remaining monographs on this system. Description of the system and of the methods of applying it to drugs and chemicals are given in: *Method of Designating Colors*, RP1239; "Instructions for Determining the Color Names for Drugs and Chemicals," *N. F. Bulletin*, *8*, 359 (1940); "Central Notations for ISCC-NBS Color Names," *Journal of the American Optical Society*, *31*, 587 (1941); "Specification and Description of Color," *ASTM Bulletin*, p. 19 (December, 1942).

Fischer Color Chart: A chart of 108 colors for the description and identification of flowers. New England Gladiolus Society, Norwood, Mass.

Flag of the United States: Scientific definitions of the red, blue approved by all departments of the Government. Secti *Federal Standard Stock Catalog*, Specification TT-C-591, July 3 Superintendent of Documents, Washington.

Foundry Patterns on Wood: Standard system of marking foundry patterns, using black, yellow and red. Accepted by associations. Commercial Standards CS19-32, U. S. Departm Commerce, National Bureau of Standards, Washington.

French Color Standards: Two widely used French sources fo standardization are: *Code Universel des Couleurs* by E. Seguy (720 sa and special books published by The French Society of Crysanthe

Gas Masks: A system to identify respirators and gas masks dustry. The colors used are white, black, green, blue, yellow, red. *Safe-Practices Pamphlet No. 64*, National Safety Council, Ch

Hiler Color Chart: A system of color harmony and color ide tion in chart form. Later edition contains 162 samples with car box containing mask matching apertures and showing mat an finishes of the colors. Available through Favor, Ruhl & Co., C and New York.

Historical Color Guide: A comprehensive review of traditio period colors. Contains 146 specimens. Written by Elizabeth Meyer. William Helburn, Inc., New York.

Horticultural Colour Charts: Published under the direction British Colour Council, London. Two volumes, containing abo color samples. Used for standardization in horticulture and in

Inter-Society Color Council: An effort to develop a standard nation for colors, using words commonly understood. Appro various associations and applicable to widespread use in scien and industry. *Research Paper RP1239*, U. S. Department of Com National Bureau of Standards, Washington.

Kitchen Accessories: A group of 6 colors for kitchen acce white, kitchen-green, ivory, delphinium blue, royal blue, red cepted by the National Retail Dry Goods Assn. and approve conference of manufacturers, distributors and users. Comm Standard, CS62-38, U. S. Department of Commerce, National of Standards, Washington.

Munsell: The *Munsell Book of Color* is a widely accepted system o identification in the United States. Present edition contains so samples. New and enlarged edition is in preparation. Publis Munsell Color Co., Baltimore.

Nu-Hue Color Directory: An elaborately boxed series of color ards in actual paint—over 1,000 in number, and all mixed from palette of paint toners. Published and distributed by Martin- Co., Chicago.

Ostwald: The Ostwald system of color, widely used in E England and America, contains over 600 samples. Two se standards are available, one produced by Winsor & Newton of L and the other by Container Corporation of America, Chicago.

Piping Systems: Schemes for the uniform identification of systems in industry. Red for fire protection; yellow (or oran dangerous materials; green (white, black or gray) for safe ma blue for protective materials; purple for valuable materials proved by American Standards Assn., A13-1928.

Plochere Color Guide: One of the most complete sets of color ards ever produced in America. Contains over 1,000 samples, box

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ARDS FOR COLOR IDENTITY

f the United States: Scientific definitions of the red, white, pproved by all departments of the Government. Section IV, *Standard Stock Catalog*, Specification TT-C-591, July 3, 1934, tendent of Documents, Washington.

ry Patterns on Wood: Standard system of marking wood patterns, using black, yellow and red. Accepted by various tions. Commercial Standards CS19-32, U. S. Department of rce, National Bureau of Standards, Washington.

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Accessories: A group of 6 colors for kitchen accessories: kitchen-green, ivory, delphinium blue, royal blue, red. Ac- by the National Retail Dry Goods Assn. and approved by a ce of manufacturers, distributors and users. Commercial d, CS62-38, U. S. Department of Commerce, National Bureau ards, Washington.

l: The *Munsell Book of Color* is a widely accepted system of color ation in the United States. Present edition contains some 400 New and enlarged edition is in preparation. Published by Color Co., Baltimore.

Color Directory: An elaborately boxed series of color stand- ctual paint—over 1,000 in number, and all mixed from a basic f paint toners. Published and distributed by Martin-Senour cago.

l: The Ostwald system of color, widely used in Europe, and America, contains over 600 samples. Two series of s are available, one produced by Winsor & Newton of London, other by Container Corporation of America, Chicago.

Systems: Schemes for the uniform identification of piping in industry. Red for fire protection; yellow (or orange) for s materials; green (white, black or gray) for safe materials; protective materials; purple for valuable materials. Ap- y American Standards Assn., A13-1928.

e Color Guide: One of the most complete sets of color stand- produced in America. Contains over 1,000 samples, boxed and indexed. Available through G. P Angeles.

Poisons, Explosives, Gases: The recognizes and insists upon special flammable liquids, explosives, acid are white, black, red, yellow, blue,

Process Colors: Adopted (1927) by the American Institute of Graphic Assn. of Advertising Agencies and Recommended standards for process

Ridgway: The most renowned h tains about 1,000 samples, each ide archaeologists and naturalists. Washington, 1912.

Sanitary Ware: Standard colors products made of vitreous china, e green, orchid, ivory, blue, light b ference of producers, distributors CS30-31, U. S. Department of Comm Washington.

School Bus Chrome: Standard yel approved by representatives of the International Textbook Co., Scrant

School Furniture: Standard colo by a conference of producers, distri ment. Simplified Practice Recomm ment of Commerce, National Bureau

Sedimentary Rocks: Goldman an 114 colors for the description of Geology and Geography, National

Signal Glasses: Scientific descript red, yellow, green, blue, purple, lu cation, 69–35, American Assn. of R

Soil Colors: A showing of 54 diff Publication No. 425, U. S. Departm

Standard Color Card of America card for all color-using industries. includes many official colors standa United States Government, such government standards.

Traffic Devices: Standard practi and highways—traffic lights, sign Assn. of State Highway Officials, W

U. S. Army Color Card: Army c arms and services and approved by by Textile Color Card Association,

U. S. Army, General Paint Speci used by the Army in the purchase o plement to No. 3-1, issued by the Q

U. S. Army-Navy Aircraft Stand in the purchase of finishing mat Bureau of Aeronautics, Navy Depa

U. S. Ribbon for Service Medals: the ribbons used on medals and dec 7-3B, Washington.

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through G. Plochere, 1820 Hyperion Ave., Los

Gases: The Interstate Commerce Commission
s upon special labels for shipment of gases, in-
xplosives, acids, etc. The colors generally used
, yellow, blue, green.

opted (1927) by the Standardization Committee of
te of Graphic Arts and approved by the American
Agencies and the National Assn. of Advertisers.
rds for process red, yellow, blue, black.

st renowned historical work in America. Con-
nples, each identified by name. Widely used by
naturalists. Published by Robert Ridgway,

andard colors for plumbing fixtures and allied
reous china, enameled iron, etc. The colors are
, blue, light brown, black. Adopted by a con-
, distributors and users. Commercial Standard,
tment of Commerce, National Bureau of Standards,

Standard yellow adopted for school buses and
tatives of the 48 State Departments of Education.
ok Co., Scranton, Pa.

Standard colors for school furniture as adopted
roducers, distributors and buyers of school equip-
ractice Recommendation, R111-30, U. S. Depart-
National Bureau of Standards, Washington.

Goldman and Merwin Color Chart, showing
description of sedimentary rocks. Division of
phy, National Research Council, Washington.

ientific description of colors used in signal glasses:
blue, purple, lunar white. Signal Section Specifi-
ican Assn. of Railroads.

wing of 54 different colors of soil. Miscellaneous
U. S. Department of Agriculture, Washington.

rd of America (9th Edition): The master color
ng industries. It contains 216 standard colors and
al colors standardized for various purposes by the
rnment, such as colors for uniforms and other
ls.

Standard practices in the use of color on streets
fic lights, signs, curb, markings, etc. American
way Officials, Washington.

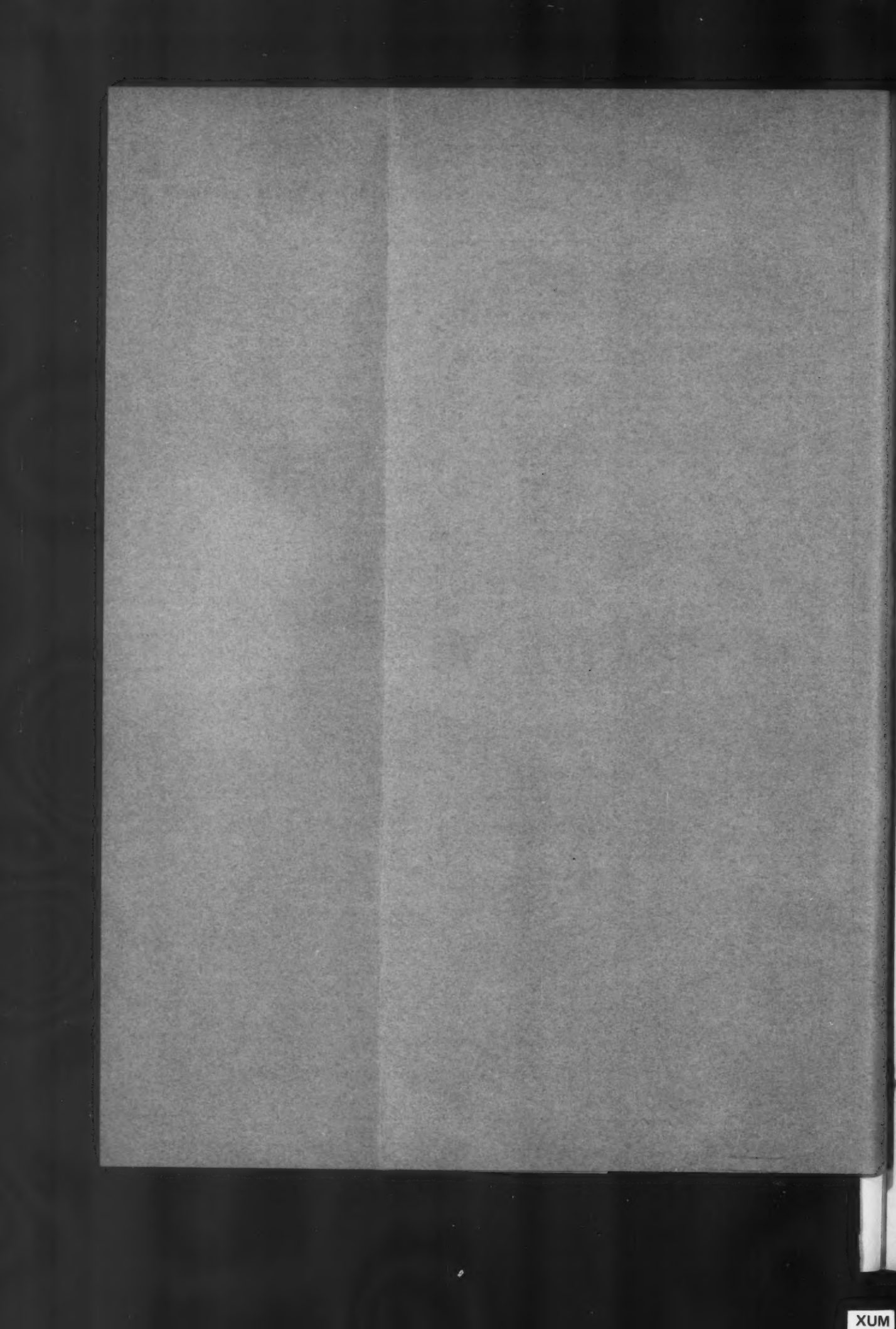
Card: Army colors standardized for the different
d approved by the Quartermaster General. Issued
rd Association, New York.

al Paint Specifications: A showing of 24 colors
the purchase of paint and related materials. Sup-
issued by the Quartermaster General, Washington.

Aircraft Standards: A group of 15 colors used
finishing materials for aircraft. Issued by the
ics, Navy Department, Washington.

rvice Medals: General color specifications for
medals and decorations. U. S. Army, Specification

hereof in any form.



How artists choose package colors

by Herbert Kaufman

The importance of color in a package design is well recognized. Color, however, always seems to be surrounded by a certain amount of mystery and complexity. Its appeal is largely emotional—particularly in mass markets where the average human is likely to be impulsive in his likes and dislikes. With an almost patriotic emotion, certain hues will be favored and others will be renounced.

In the sale of mass merchandise, for example, hard experience shows that color trends are difficult, if not impossible, to force. A man or woman may be educated to unusual functions, forms and designs. But color is something else—and the designer who goes contrary to the instincts of public taste is apt to see his attempts pretty well disregarded.

In an effort to get the opinion of leading American authorities, the General Printing Ink Corp. has conducted a special survey on the matter of color. In a line of endeavor which is really an art, perfect unanimity —or regimentation—of opinion could hardly be expected, nor indeed would that be desirable. But an interesting array of ideas came in response to the following four questions:

1. Does the type of product influence the selection of color for the package?
2. Are certain colors chosen to make the design more effective from the standpoint of eye appeal?
3. Is thought given to the resulting pattern on the shelf and window set-ups displaying the package?
4. Is a functional reason responsible for the designation of color in packaging?

The answers have been quite stimulating and enlightening. Important names have been heard from—Frances Cushing Hall, C. O. Woodbury, Russell Grau, Egmont Arens, Thomas D'Addario, Louis Koster, Joseph B. Federico, William O'Neil, Joseph Carter, Charles Cruze, etc. Their comments are given herewith, anonymously.

I feel that the first thing to consider is the relation of color to the contents of the package. For example: the color for a face powder package must suggest daintiness and beauty. Delicate pinks, greens and soft blues could be used. Gold and silver suggesting value could also be appropriate. Pink would have the widest appeal.

The type of consumer to which the product is to be sold is also a very important factor in deciding what color to use. If a product is to appeal to the great mass of middle class purchasers it cannot use the unusual, high-style colors possible for a small but expensive distribution. In the above example pink and green would have a wider appeal than a magenta and gold combination.

The color scheme is very dependent upon the position of the package when it is seen by the customer. A more contrasting and bright color arrangement is possible and desirable when the packages are on a shelf six or more feet from the customer than when the package is to be seen in a showcase close by. In the former case, the colors must be sufficiently contrasting for easy legibility.

When numbers of packages are to be displayed together as a usual thing, a design that makes a pattern with the group is highly desirable. This would be true for dry cereals, for example.

Often color for a package is chosen to enhance the color of the product. A dark blue-purple makes the contents of a package seem whiter.

Color has to change as the colors for interior decoration vary. When towels and bathroom fixtures are delicate in color, bright red and black packages seem out of place so are not desirable. The same thing is true for food packages but not to quite such an extent.

Colors used in food packages should have an edible quality, that is, they must either suggest delicious food or be complementary to it. For example, yellow is appropriate for a package for poultry seasoning because yellow makes a roast chicken an appetizing background.

It has been my experience in package design that the product itself often suggests or even dictates the color or colors to be used. Color is usually used for eye appeal, often as a force to command attention.

I would say that the resulting color pattern on shelves and in window display arrangements is a possible consideration, but not so important unless one is using a number of colors, in which case the general effect is studied.

A good package design, in my estimation, is based on practicability and eye attraction. Printing, packing and shipping problems should be considered first. Eye appeal should be the next consideration. The third step should be legibility. I always look at the competitor's packages and try to make my design as different as possible.

There is no doubt that color plays a big part in eye appeal. After 20 years of experimenting with people and their color tastes, I've come to the conclusion that people, much as I dislike to admit it, like the bright, primary-type colors. The subtle tones and odd shades of color combinations are lost on the average person. Bright colors and strong contrasts are always popular.

A pattern resulting from window or shelf set-ups is good and should be kept in mind, but not to the point of sacrificing the design of the individual unit.

Whenever there is a trend in packaging, I change my style to be in contrast to the trend. The only rule I would advocate in regard to color is to stand away from your competitors. For examples, let's go to nature.

1. Color suited to product is not very important save as a sentiment in the manufacturer's heart. A red

coffee package will outsell a coffee-colored coffee package every time. But look out for poisonous-looking greens on food packages.

2. High-vibration colors are certain to get more attention than low-vibration colors. This is true regarding shades of color too. A brilliant blue with violet tinge will stand out against a blue-black.
3. In certain items that are displayed in stacks, stack appeal is more important than individual package appeal. I remember a package that looked beautiful by itself but when stacked looked like a lot of worms, owing to a ribbon effect used in the resin. I never let a customer decide on a package until he has seen stacked multiple dummies.

The choice of color is also dependent on competition. If, for instance, in planning a new design for a coffee package I found that most of my clients' competitors were using a color scheme of dark brown, light brown and red, I would attempt to create something different in design as well as in color scheme. I might retain the brown and use, in addition, golden yellow and black. The juxtaposition of colors in certain ways can be made to add attractiveness and distinction to the package.

Every packaging job that has come my way has brought with it a long background of traditions, preferences and so on which could not be ignored. Indeed, treated sympathetically, this background has invariably proved the rock on which the more successful packages were built. Here are a few examples:

1. A specific red and a certain green had to be used as the product's chemical content precluded the use of other colors. This package was one of the Gold Award winners of that year. The client still rates it a winner.
2. A family of ten, each with a color all its own, exhausted the scale of primary, secondary and tertiary colors suitable for packaging use.
3. A brilliant red and a dark blue are hard to beat at any time, but when the name on the package of itself stirs memories of 1776, what alternative colors could one choose?
4. In the cosmetics field, an older product was packaged in a grayed blue. Obviously, for the new baby a misty rose was chosen.
5. A package to be redesigned was over-decorated, over-worded and too vari-colored. Design and copy were streamlined, a fine cherry-red and golden yellow retained. Now, recognizable to old friends, inviting to new, our hero steps out.

The type of product definitely influences the color of a package. For example, in the packaging of auto parts, you might consider a combination of orange and black, because they are strong colors, but you would not consider this combination for cosmetics, where you are attempting to create a feeling of refinement. The type of customer you are attempting to reach has a bearing on the color scheme as well.

In the creation of a design, not only the size of the package and the design are considered at one time, but color as well. It is well known that color can be used to create entirely different atmospheres, thus making it difficult to separate design and color.

Quite a bit of thought has to be given to the resulting pattern on the shelf or window. It must fit into its surroundings, while at the same time drawing attention. I believe that this is one of the most difficult problems in the designing of a package.

There is a functional reason for color in a package. It must help catch the eye, hold the person's attention, create a desire to buy, bear out the quality of the product, and fit into its ultimate surroundings in the home or wherever it is to be used.

First, the type of product has a very definite bearing on the selection of color as well as the use of the product. The price of a product effects color selection as well. For example, products appealing to the intellectual go to a smaller market, must be priced higher. Color for this group is selected from the so-called intellectual range, and the determination is usually made on the basis of common sense and experience in matters of good taste. There is no rule that I know of save that if you have good taste, good merchandising sense, and a fair picture of your market, you can convince your client that the color of his product will agree with his market.

Secondly, colors are chosen to make design more effective from a standpoint of eye appeal by a complete study of competitive colors, sectionally and nationally. The experienced package designer has a "feeling" which is backed by experience and "know-how" in arriving at his selection, though the answer is obvious when the package is displayed competitively.

Thirdly, the idea of pattern in display is, to my way of thinking, an additional distraction to force on the point-ridden consumer. The idea of display is to focus attention on the product and not on some galloping pattern that leads your eye to rest on the competitor's product. If a package design is good, it should stand by itself, just like a salesman. Customers resent ganging up on them by salesmen.

Fourthly, the question of function is similar to Question One. Soap should clean. If it cleans clothes, the color should suggest it. If it cleans faces in a particular manner—to give beauty or freshness, or to remove blemishes—an added thought must be incorporated into your color selection. If blue does the job for clothes, adding rose for skin freshness changes the range into purple—and if medication is suggested, you have a herbal or green range to combine with your purple. With this preliminary reasoning, you add your experience, judgment, knowledge of market in relation to consumer preference, etc., and you finally arrive at a color which the client's secretary doesn't like.

To sum it up, a real good package design job must be *arranged* and *colored* to convince the consumer that the product is right, is priced right, and will stay right in his eyes long enough for him to repeat purchasing many times through his lifetime.

Preparing art work for reproduction

by Herbert J. Kaufman

No matter which system is used to describe a color, we must acknowledge the fact that all color possesses three characteristics. Just as in measuring a box we give its length, width and depth, so too in measuring color we use the three dimensions of hue, value and chroma.

Hue is the quality by which we distinguish one color from another, as red from yellow or yellow from blue. *Value* is the lightness or darkness of a color as compared with a scale of grays from white to black. *Chroma* is the strength of a color or the quality by which we distinguish a pure color from one that is grayed.

To apply these three dimensions, we first describe the hue of a color, as green; then designate its value, or lightness or darkness. To complete the description, we give its chroma—whether it is a rich or a grayed green.

Primary considerations in the selection of package colors are visibility and legibility. The principle to be observed here is that of sufficient contrast in value. Differences in value, without regard to hue or chroma, may make or mar the result. Contrast in value will make lettering or type, legible or illegible. A color of middle value will be least distinguishable on a color of equal value and the greater the contrast in value, the greater the legibility. In this connection, bear in mind that simultaneous contrast affects value contrast. A neutral gray of middle value appears lighter against black and darker when contrasted with white. The same thing holds true with any given hue.

Reproduction methods

The processes available for reproduction fall into three major classifications, according to whether the surface is raised, level or lowered.

Letterpress—Printing which comprises reproduction where the image to be printed is raised. Type, line cuts, halftones, bendays, stereotypes, electrotypes, tint blocks, rubber plates, wood cuts, linoleum blocks, etc., fit into this category and are the means of reproducing copy. The raised surface permits the inking roller to leave a deposit of ink which is then deposited directly on paper. Obviously, the plate or cut must be in reverse so that the image is positive on the paper. Sheet- and web-fed presses are utilized in this process. For halftone and four-color process work, it is necessary to use smooth surface or coated papers.

Planographic—In this process, the image is on the same plane as the non-image area, but the image is ink-receptive while the non-image section is ink-repellent. The principle of oil and water never mixing applies in this process. In the early days of lithography, blocks of stone (limestone) were used, but today thin metal plates (aluminum or zinc) are the rule. The image is positive, since a transfer of the inked impression is made first on a rubber blanket and then on the paper—hence the commonly used term, "offset lithography." Some direct lithography, using the reverse image, is still being done. *Photo-lithography* is the photo-mechanical method for making press plates. Two types of plates are used: albumin and deep-etch. The latter has an infinitesimally lowered image section. Most presses are sheet-fed (some web-fed), and almost every type of paper from rough surfaced to fine coated can be utilized.

Collotype or photo-gelatin—This process is based on the oil-and-water never mixing principle. The non-image areas are made ink-repellent by allowing the exposed gelatin-coated plate to absorb varying amounts of a glycerin solution. Unlike the lithographic process, no water is used; the required moisture is drawn from the air. Another dissimilarity is that no screen is used, since the finely reticulated surfaces of gelatin produce a print closely resembling a photograph.

Intaglio or gravure—This process is just the reverse of the letterpress method. The image is below the surface and can be likened to ink wells. The reproducing plate or roller consists of regular (screen) or irregular (grain) etched impressions, or lines and dots engraved by hand. These are filled with ink and the surface is then wiped with a "doctor" blade, thereby removing excess ink. The inkwells or cells, which are of varying depth, then transfer their different quantities of ink to the surface of the paper (sheet- or web-fed).

Gravure differs from letterpress and lithography in that the gradation of tones is effected by varying the thickness of the film of ink transferred to the paper, rather than the size of the dots. However, in the new (Dultgen) halftone method of reproduction used in color gravure, the dots are larger for solids and the film of ink thicker than in the light tones.

In addition to these three major reproductive methods, there are others such as silkscreen, novaprint, thermographic, etc. It is best to consult an expert in the respective fields for advice on which to use. All processes have their advantages and disadvantages, depending on what you plan to achieve, and all produce different results. For further details of any particular process, a reference list is appended.

Copy selection factors

Another thing to consider is that copy must be prepared differently for various reproductive processes. In general, copy that is good for one process is good for any of them. It should be half again as large as desired in the finished print so that it can be reduced a third in the camera. Contrasting photographic copy reproduces better than soft photographs do. Type proofs should be clean and sharp and pulled from new type if possible.

For letterpress, photographic copy should be carefully

EFFECT OF INKS ON COLORED STOCKS

Stock	Good colored inks	Poor colored inks
YELLOW	Red, warm green, orange, brown. Deep blue or violet may neutralize favorably to a deep black	Blue will turn olive. Purple will turn brownish. Cool greens turn grayish
RED	Red, opaque yellow, opaque orange, maroon, warm purple. Deep blue and purple may form black	Green will turn brownish. Blue will turn muddy. Yellow, if not opaque, will wash out
ORANGE	Red, rich orange, brown. Deep intense blue or purple may form black	Yellow will wash out. Blue will turn brownish. Green will turn olive
GREEN	Deep green, blue, violet, opaque yellow	Red will turn muddy. Orange will turn olive. Purple will turn dull
BLUE	Deep blue, green, purple	Red will turn dull. Orange will turn muddy. Yellow will turn olive

selected for clarity and sharpness. The photo-engraver is practically helpless in trying to reproduce from poor copy. The camera eye is relentless in picking up defects, and a few dollars spent in retouching by an artist will often more than compensate the package for the expense involved. Avoid gray, non-contrasting shots.

Art work and lettering should be firm, sharp and clean. Fuzzy lines should be eliminated by the artist because while the engraver can reproduce them the process is usually more costly. If possible, try to include the type in the plate; if not, the electro should include the type. To be on the safe side, always send the working dummy to the engraver so that he will know what it is all about. Avoid fine delicate type, especially serif types, for reverse plates (in which copy appears white on black background).

The most desirable copy is furnished all in one piece and is done in the same medium throughout. In other words, do not supply one piece of copy in water color and another in oil or Kodachrome and expect to get a perfect reproduction of each. Most houses rate media as follows: transparent water color, opaque water color, oils, pastels. Carbros are satisfactory if they are in register. Kodachromes are excellent if the shop has had experience with them. Colored photographs are usually the least desirable.

Background tints or solids in gravure should be made with colored papers. Variations in air-brush or other means of laying in color, while not apparent to the eye, come up with discouraging results in the final print. The best method is to have the tint "flushed in" by the gravure printer.

Legibility of color

Because legibility is an important factor in the success of a package, the following notes based on practical, scientific research are of value.

The most legible of all color combinations is black on yellow. White tends to blur, particularly in strong light, because of aberration in vision which scatters the bluish rays of light. In addition it lacks the attention value of pure spectral hues. Next to black on yellow comes green on white, then red on white, blue on white, white on blue, black on white, red on yellow. For fairly dim illuminations, typical of those found in retail stores, generally light packages are superior to dark ones for high visibilty. This is because the deeper colors tend to recede into their environment and be inconspicuous.

Illusions

Another factor bearing on the finished package is illusions. Light areas will appear larger in size than dark areas. This is because the light area, focused on the retina of the eye, tends to create an active rather than a passive image. Its edge tends to spread out like water on a blotter, thereby giving the light color increased dimensions. According to research the largest appearing color is yellow, then white, red, green, and blue, with black the smallest of all.

In a similar way, bright and pale colors will seem light in weight, while deep colors will seem heavy. Generally, the light and warm hues will tend to advance and appear nearer, while the cool and deep colors will tend to retire. The reason for this is that the lens of the eye grows farsighted when focused on rays at the red end of the spectrum and nearsighted when focused on rays at the violet end. The neutral point is in the yellow region.

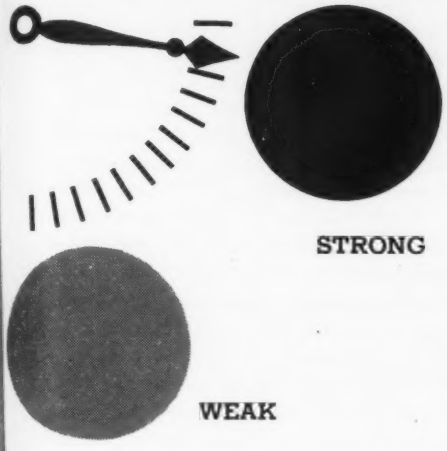
Color clarity

Printing inks as well as paper stocks are of two main textures: (1) opaque and matt; (2) transparent and smooth. Brilliance of color generally is assured if the texture of the ink is like the texture of the stock. With dull-finish boards and papers, a dull-finish ink will appear richest. Where for purposes of protection a varnish is applied, the matt appearance will largely disappear and the colors will grow deeper and shinier. With finished papers and more shiny inks, clarity will increase. All colors will deepen if coated with varnish.

If some attention is paid to the above facts, the unkempt appearance of many containers may be overcome. Mottled, splotchy surfaces often result from the inks being only partially absorbed by a paper stock. If the inks are shiny and the stock dull, the result will naturally be poor. To assure a good, clean finish one of two things may be done: (1) On a dull, absorbent stock, specify inks that are also dull. The all-over effect will be consistent. (2) If basic inks and stock match in texture, an all-over application of varnish will affect them uniformly. Again the effect will be consistent. However, if shiny inks are used on dull stocks, a varnish coating will emphasize the gloss of the ink, but do little to improve the stock, and the container may thus tend to appear shoddy. Shiny inks on finished and enameled stocks rarely cause trouble, with or without varnish.

Good clarity of color is in constant demand, for such effects have the greatest human appeal. Ordinarily, clean, white stocks print best with transparent inks. Such inks reflect light from the surface of the stock through the ink film and, therefore, have a luminous beauty. On stocks that are grayer or yellower in tone, or thick in texture, the transparent ink will not be at its best. Here an opaque ink is desired—one that will hide the stock and reflect light from its surface rather than

Color Appeal



Both of these blues came out of the same can. One was printed with correct makeready and a right impression of ink. The other was weakly printed. Under competition, these two colors would rank one hundred per cent and zero per cent, respectively, judged side by side.

One of these orange toners was printed with proper makeready on a clean press. The other was printed under smudgy conditions. Practically every human eye will have the same reaction to the two results—the one cheerful and one repellent.



Color Legibility

Legibility is an important factor in many types of printing. To solve the problem effectively scientific facts must be carefully weighed against human vision.

White on black also offers good contrast.

Legibility is an important factor in many types of printing. To solve the problem effectively scientific facts must be carefully weighed against human vision.

Where prolonged attention is given to the printed word, black on white is the best of all the color combinations.

Legibility is an important factor in many types of printing. To solve the problem effectively scientific facts must be carefully weighed against human vision.

Where reading conditions involve brilliant light, black on ivory or cream is desirable

LOOK

Black on yellow is the most legible of all the possible color combinations.

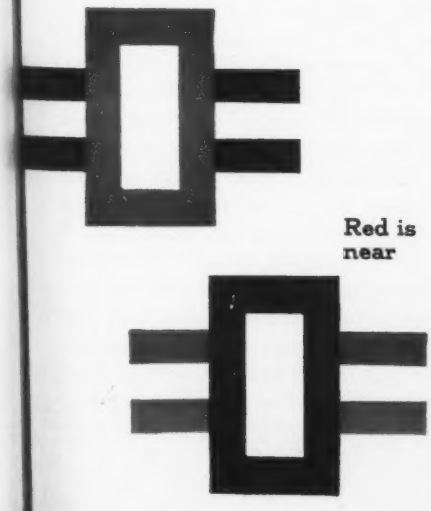
LOOK

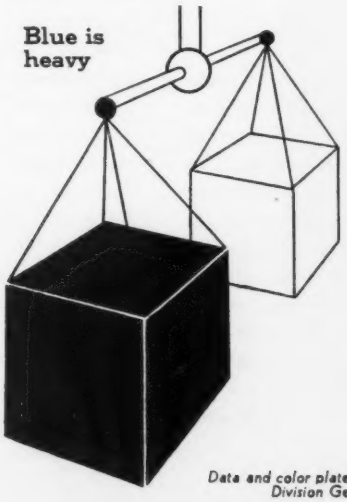
Red on white ranks third in color attention value, and blue on white, fourth.

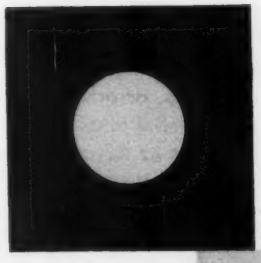
LOOK

White on blue ranks fifth, and black on white sixth in color legibility.

Color Appearance









Data and color plates courtesy Eagle Printing Ink Co., Division General Printing Ink Corp.

penetrate into it. Thus a transparent ink may be quite beautiful on coated stock, but grayish and dull on uncoated. Conversely, an opaque ink may glisten brightly on dull stock, but appear thick and dim on shiny stock unless it is formulated to dry with a high gloss similar to that of the board or paper.

Color mixture

There are three primary colors in printing ink: red, yellow, blue. Toners of these three hues, in various shades, will form most other colors either in actual mixture or in screen combinations.

Where one ink is printed over another or on a colored stock, the result will be good or bad depending on whether the colors are closely related or complementary. No printing ink is absolutely opaque. Therefore, complete coverage cannot be expected. The package designer should study the table on p. 60 as a practical guide to color effects obtained, both on colored stocks and from overlapping inks.

Ink textures

Beauty of color in an ink implies not only proper choice from the spectrum, but also consideration of texture. A red ink, for example, may be specified as: 1) ordinary transparent, 2) ordinary opaque, 3) bronze red (with metallic top tone), 4) dull-set (to have the appearance of a matt surface), 5) high gloss, 6) silversheen. In each case red will be seen, but its finish will differ. Each particular texture has its appropriate beauty. The dull-set ink, for example, lets the vehicle anchor into the stock, thus holding the pigment on the surface and reflecting light almost equally from all angles, without shine. The glossy ink, vehicle and all, dries on the surface into a hard, lustrous film which reflects light more like glass or a highly polished surface. The silversheen ink combines a colored toner with an aluminum powder and has a beautiful finish which changes in appearance when viewed from different angles.

Color effects on metals, plastics, glassine, flint and pyroxylin coated papers, foils, waxed papers, cotton bags, glass, cellophane, etc., generally require specially formulated inks. Since such colors are ordinarily designed to dry on the surface of the material a wide choice of textures is not possible.

Technical aspects

One of the important problems in the printing of packages for foodstuffs, or other commodities with delicate odor or flavor, is that of off-odors caused by the printing ink. These odors or flavors are usually in the vehicles for the printing ink as a result of chemical reaction during drying. In printing packages of this sort, extreme care should be taken, because it is quite possible to compound inks so free from objectionable odor that they will not affect the product deleteriously. Recently, by a use of some of the newer synthetic materials, it has been possible to formulate inks that are entirely free from objectionable odor. For various reasons these inks are not adaptable to all cases, but they should certainly be considered where odor or flavor is so important that one can afford to go to any lengths to preserve its quality.

Incidentally, it should be noted that ink is not the only offender in respect to odor and flavor. Other components of the package, such as paper, adhesives, closures—anything that in any way can come in contact with a perishable article—should be carefully checked.

In a few cases it may be desirable to add an odor to the ink, not to cover objectionable odors, but for some specific purpose. In general, this idea has not been particularly successful because of loss of the odoriferous principles by evaporation.

In the case of package inserts, the selection of printing ink is of the utmost importance. Here the inks must be not only free from any deleterious odor or flavor, but also unaffected in any way by the contents of the package. Neither are they permitted to contain any poisonous ingredients, if the contents of the package are to be used for food or in contact with the body in any way. Each particular package must be carefully studied. In general, inks must resist oil and moisture, and, occasionally, abrasive action. The essential oils used as perfumes and food flavors are particularly active solvents for ink vehicles. In some cases, such as dried cereals, there is a surprising amount of abrasive effect during shipping.

When cotton bags are used as containers it is a great advantage if the printing inks can be readily removed by washing. It is common practice, especially in the rural communities, to utilize the heavy bags which come in as containers for flour, animal feeds and other farm products, as a source of strong cotton cloth, particularly for dish towels, even as garments. Here it is essential that the printing ink be completely removed by ordinary washing. Such inks are readily available if specified.

Because many packages are designed specifically for their attractiveness in displays, and hence will be freely exposed to light in windows, on counters, presentations, and store shelves, the printing inks used on the packages must be sunfast. The package producer, therefore, must be sure that the printing inks which he has purchased are well chosen, so that his package will not look dull and dingy after exposure in the retail store window.

As it begins to play an increasingly important function in preserving its contents against gain or loss of moisture or flavoring and other unwelcome changes, the package becomes increasingly complex in production. It is essential, therefore, that printing inks be considered in terms of plant procedure. For instance, if the package is to be coated with a moistureproof lacquer, special care must be taken both with the inks and in the scheduling of work from printing press to lacquer machine, or the lacquers will not adhere properly to the printed areas. Likewise when ordinary coated or uncoated paper is replaced by plastic sheet materials, metallic foil, coated paper of unusual properties or lacquered paper, it will inevitably mean that the ink, too, must be changed to suit these new materials. Further, one frequently finds that it is impossible to use the same printing machinery, and hence the whole process of package fabrication is seriously altered.

Silk screen for packages

by Eugene Morley

The silk-screen process, until recently known chiefly in poster and display fields, is rapidly coming to the fore as a means of decorating packages by imprinting directly on the surface. It is especially valuable in the cosmetics field where the appearance of the package and its counter appeal affect its sale so directly. Its use is increasing in this field for that reason, but it is also being used to a greater extent in some other fields where its practical aspect rather than its appearance is the factor. Many milk and soft drink bottles intended for re-use, as well as at least one top whiskey bottle, are decorated or marked by the process and fired at glass-melting temperatures to form permanent imprints, thus eliminating a new labeling operation at each filling.

Since silk screen is a stencil rather than a printing process, it is often successful in combating problems well beyond the scope of true printing—letter press, planographic or intaglio. Because its machinery is not as advanced as that of the true printing processes, it has some disadvantages which limit the number of its uses—mainly the disadvantage of greater cost.

As a process it has a short but interesting history. Its development is entirely American, and the earliest use that has come to the attention of any writer on the subject is in the printing of felt pennants in 1910 or 1911. The substance of the felt offered a difficult fibrous surface which received too little ink in other printing methods but accepted the heavy silk-screen deposit readily. By the late Twenties, its use became nation-wide as a medium for printing posters and display cards in runs too short to be practical in another printing method and too long to be practical in hand painting. Its means during most of this period were crude, and its uses were often limited to circumstances where its only advantage was low cost in short runs. The late Twenties and early Thirties saw some technical advances which mightily increased the scope of the medium and revealed the prospect of new possibilities.

It is used at present in industries which must seem queerly unrelated unless one understands the nature of the medium technically. Among those fields are poster and display as before, and ceramics, textiles, wallpaper, instrument dials, toys and novelties, packaging, plastics, book illustration and—most unbelievably—the Fine Arts. In the last-named field it is used both as a reproduction medium for some of the world's finest paintings and as an artists' original medium similar to lithography and etching.

Its technique is at once simple and complex. Its rudiments can be mastered in an hour, yet a fine result can be achieved only by a master technician, and these are few since they have gained their experience only during the past twenty years or so. The principle involved differs basically from that employed in the true printing processes since the stencil principle is called upon. Silk screen is stenciling quite as truly as is the act of a shipping clerk who stencils a destination on a packing box with the use of cut-out brass letters and a heavy ink-filled brush; it differs only to the extent to which refinements have been introduced.

In the packing case stencil, the chief limitation is that the stencil will not hold together unless certain bridges occur in each letter to hold isolated centers in place. This is eliminated in the silk-screen process by using a stencil material more pliable than brass (usually lacquer or gelatin) and adhering it firmly to a tightly stretched mesh of silk or of metal. The printing material—which may be lacquer enamel, ceramic or almost anything mixed with a suitable adhesive—is not now applied by means of a brush, but is, instead, forced by the action of a rubber squeegee through the mesh of the silk and through the stencil to the printing surface beneath.

The deposit thus made is controllable in every respect. It may be thick enough to produce the dots of Braille type or it may be infinitesimally thin; it may be mat or gloss, opaque or transparent; and it may be any color whatsoever that is available as a pigment. Since the imprint made is a deposit rather than a "kiss" imprint, it is applicable to almost any surface firm enough to hold to-

1. Silk-screen decoration has distinctive eye appeal, is practical as well. Photo Creative Printmakers Group.





2

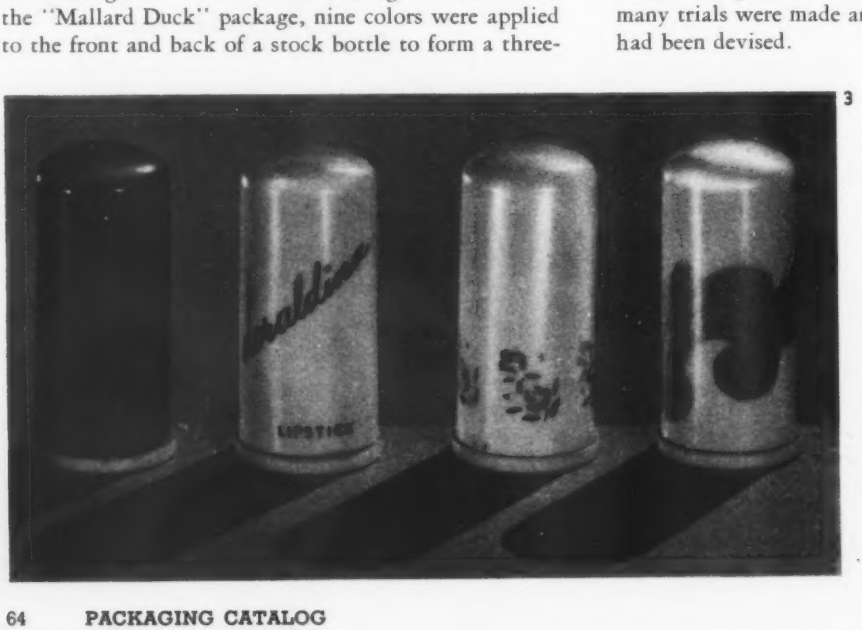
2. The silk-screen process brings poster art to milk bottles with a war message. Photo Owens-Illinois Glass Co.

gether. Each additional color requires a separate printing operation— no means as yet is available for applying several colors in one operation—but where the appearance of a package warrants a somewhat higher printing cost, as many colors as necessary may be applied in perfect register without any limitations as to the complexity of the design or the size of the lettering. In the case of the "Mallard Duck" package, nine colors were applied to the front and back of a stock bottle to form a three-dimensional effect that has set this package high in its field.

Wartime restrictions and the resulting tendency to use more and more stock molds in plastics as well as in glass, have emphasized the value of decorating directly on the package. By this means, where several products or a similar product made by several manufacturers are apt to appear on the market in identical containers, it is very important that each achieve a distinctive appearance.

This problem is chiefly apparent in the case of plastic lipstick containers. A few shapes and sizes must now serve the packaging needs of many manufacturers. Most of them are now decorated by silk screening the makers' imprint or design directly on the plastic service. A thoughtful use of color and design distinguishes one lipstick from another easily even though the silhouettes be identical. Most plastics now in use cannot be permanently imprinted in lacquer or enamel, the more familiar silk-screen materials, but the adaptability of this process permits the use of printing materials especially designed to form a permanent bond with the plastic surface.

The war has made its demands upon the silk-screen industry as it has upon all others. Again special printing materials have had to be developed for imprinting containers for medicines and drugs in such fashion that the imprints would withstand successfully the conditions met in wartime uses. The most remarkable wartime use to which the process has been put is the imprinting of luminescent instrument dials for aircraft, submarines and other machines of war. The luminescent material was formerly applied by hand since its consistency made it impossible to apply by an imprinting process. Silk screen was able to solve the problem of calibrating these dials in production quantities, but only after a hard struggle—tolerance requirements of ± 0.005 in. were not met until many trials were made and new equipment and methods had been devised.



3

3. Identical containers, made from stock molds, can be highly individualized by decorations applied directly to the package. Here silk screen does the job for lipstick containers. The printing materials which are used are designed especially to form a permanent bond with the plastic surface. Photo Creative Printmakers Group.

Roll-leaf stamping

by Alfred A. Morse

For the marking or embossing of products which are made of plastics, wood, hard rubber, fibre, paper, cloth, etc., a method frequently employed is roll-leaf hot stamping. Under certain conditions, it is sometimes possible to use this process for marking metal surfaces which are heavily coated with enamel or lacquer.

The process of roll-leaf hot stamping utilizes the best features of several other processes with none of their disadvantages. It is like engraving, in that impressions are usually made below the surface of the material being marked. It is like letterpress printing, in that pigments are used as well as genuine and imitation gold and because the work can be done in some cases on a printing press equipped with a roll-leaf feeding attachment. In one single press operation, the roll-leaf hot-stamping process combines the operations of printing, bronzing and embossing on thin materials such as cover stock, letterheads, cards, etc. With this process it is possible to emboss raised designs.

Under wartime conditions there is a large field of application in marking, for identification purposes, aircraft, marine and ordnance items.

In order to do roll-leaf hot stamping and embossing three things are required: a stamping press, a roll of stamping foil and a brass or steel die, or type. Presses used can be classified under three varieties: (1) platen presses such as Chandler and Price, Brandtjen and Kluge, and Colt's Armory presses; (2) bookbinders' presses of the Sheridan and Seybold types; (3) specially designed upright presses such as the Peerless. The Peerless press has been specially designed for roll-leaf hot stamping and is available in rotary models as well as in the upright models more generally used. Presses can be designed for hand operation, semi-automatic or fully automatic operation.

Very little makeready is required for ordinary flat stamping such as for lettering or open trademark designs. Where embossing is required, makeready is cut on the bed of the press. A roll of stamping foil of the required width feeds across the face of a heated die attached to an electric heating plate.

Since dry colors are used exclusively, no drying time is necessary. The stamped articles can be packed immediately or used in subsequent manufacturing operations. The roll leaf comes in several shades of genuine gold, imitation gold and silver, and a wide range of colors. Two or more colors can be used at one time if they do not interfere with each other in the design. Roll leaf is available in widths up to 24 inches in 1/8-inch units. Roll leaf is usually supplied in rolls 200 feet long but can be had in special lengths if desired. Thousands of impressions can be obtained from the relatively inexpensive steel or brass dies or type.

Applications

Because of the varied characteristics of different plastics, marking or decorating such articles with roll leaf is sometimes difficult. Special presses have been developed for marking plastics, presses to operate under high pressure using steel dies. Articles of wood, on the other hand, offer no difficulty, whether the surface is flat or curved.

Another application is the imprinting of cartons. Ordinarily, quantities required must be estimated in advance and large stocks of folded and pasted blanks must be carried at all times by the manufacturer. By the roll-leaf hot-stamping process, this is all avoided. The manufacturer buys only one type of blank in each size.



Hot stamping with roll leaf affords permanence of brand names on a variety of hard-to-mark surfaces and textures.

As special imprinting is needed, a supply of the folded and pasted blanks is placed in the hopper on a carton-imprinting press, stamped automatically and ejected. Since no time is required for drying, the stamped blanks can be used immediately in packaging operations.

Box tops and wraps

In stamping box tops and wraps, the printing is first done on a platen press and the printed blanks are then fed into a press equipped with a roll-leaf feeding attachment and heating plate. These attachments are available for platen presses of the Chandler and Price or Brandtjen and Kluge type. A brass die is needed for the part to be embossed with roll leaf. This die not only releases the foil but also embosses the surface of the cover stock in the same press operation.

Standardization of package forms

by William E. Braithwaite

Manufacturers were recently asked by the National Association of Manufacturers to state what the major purpose of their industrial research would be when they could return to the study of postwar products. Cost reduction was the general answer, but many described at great length their efforts to expand markets by lowering prices. This emphasizes the importance of simplified practice in any program of postwar planning which is to reduce costs.

Simplification is not an innovation of World War I or World War II. Long before 1917, the principles of simplification were recognized as a matter of sound practice and efficiency. The essence of simplification as a policy of business management lies in the attempt to conduct all activities and to perform all functions of an enterprise in the least complicated manner consistent with any given purpose. It is in effect a composite, a philosophy which has grown out of the experience of business men and the observations of economists who have taken cognizance of certain fundamental principles as applied to production, distribution and marketing.

Simplified practice, or industry-wide simplification, was developed in an organized way during World War I to make available more raw materials and manpower, and to eliminate industrial waste. In its efforts to release the largest possible amounts of labor, capital, materials and equipment for war purposes, the Conservation Division of the War Industries Board had a choice of two courses: first, it could have production curtailed in the so-called non-essential industries; second, it could stop non-essential uses of labor, capital and equipment in all industries. The latter policy was chosen.

In the effort to obtain maximum production at minimum expenditure, many unnecessary motions were discarded. Results of this pruning down were remarkable. Factories which dispensed with various multiplicities of products and processes, and stores which did away with excessive duplication of stocks and methods, found their productive capacities surprisingly enlarged. By repeating the same motions, and concentrating on certain practices and products instead of setting up special practices, they operated with effectiveness previously unattainable.

The Conservation Division of the War Industries Board emphasized the desirability of continuing similar activities in times of peace. At the request of industry, still greater impetus was given to the movement by the organization of the Division of Simplified Practice in the U. S. Department of Commerce in 1921, to serve as a centralizing agency to coöperate with manufacturers, distributors, users and other groups concerned, in obtaining the gains which previous demonstrations had shown were possible and desirable.

It is interesting to reflect upon the fact that one of the first conferences held under the coöperative procedure of the Division was the meeting on the simplification of food containers and packages, which convened 21 years ago, in January 1923, and which was attended by more than 100 representatives of manufacturers, distributors and users of food containers as well as food packers and distributors of food products.

Since that time there has developed a widespread and systematic effort to simplify sizes and types of containers and packages. Fifty Simplified Practice Recommendations (which is 25 per cent of all that have been developed by the industries concerned and promulgated under the coöperative procedure of the Division of Simplified Practice during the past 20 years) are for containers of various kinds and packages for different commodities. In addition to these 50 recommendations, nearly a dozen more cover simplified lists of recommended standard sizes, dimensions and types of items used in connection with packing and shipping, such as thickness of fibre boxboard, lumber stock for wirebound boxes, paper shipping tags, different kinds of twine, etc.

As in World War I, the present national emergency has emphasized the complexities of business enterprise. In all our economic activities, whether of production, distribution or consumption, we are hampered by unnecessary multiplicity of practices, processes and products. That this over-diversification of products exists is, in one sense, not surprising. Our industrial growth has been rapid, and the advantages attained by the use of machinery have increased with each new invention and discovery. It has become so relatively easy to manufacture goods, that we have come to feel that our slightest whims in either production or distribution can be gratified readily. Until recently, American industry has been accustomed to producing most of our ordinary, everyday commodities in a large variety of lengths, widths, heights, thicknesses, weights, capacities, shapes, grades, sizes, types, etc. Each added item or unnecessary item has exacted its toll of immobilized material and of unproductive man-hours. It is the purpose of simplification to help alleviate this condition of superfluous variety.

As was the case during World War I, the current demands of war upon our resources and upon our capacity to produce have far exceeded any achievements that we have thought possible of attainment heretofore. To meet these demands, every resource has had to be conserved with the utmost care, every productive process keyed to the highest pitch, every effort made to keep material moving through the channels of production and distribution as rapidly as possible. Manufacturers and distributors have realized that every unnecessary operation lessens the productivity of manpower. Simplification has played a conspicuous part in the war program; it has been increasingly useful in facilitating greater production for armed services and essential civilian needs.

The greatest single immediate problem facing industry after the war will be the conversion to peacetime production of the enormous proportion of its plant capacity and labor force that has been used for war purposes. Industrial plants and machinery utilized in making war equipment and supplies must be replaced or retooled to make automobiles, refrigerators, radios, washing machines and the thousands of other items needed for peacetime economy. The transition to voluntary procedures of production and distribution that has been under mandatory orders will require careful consideration if the beneficial gains already made are to be preserved.

Industry will wish to have accurate knowledge about consumer needs and requirements if it is to obtain the best return on its invested capital. The patterns of consumer behavior will be shaped very largely by the extent to which we have used up existing stocks of durable goods and have curtailed the manufacture of such goods during the war. While the backlog of deferred demands, high-level incomes, debt retirement and accumulated savings will be favorable factors operating to promote postwar reconversion and to keep initial postwar demand and output at a high level, it will be necessary to study the probable demands for various products.

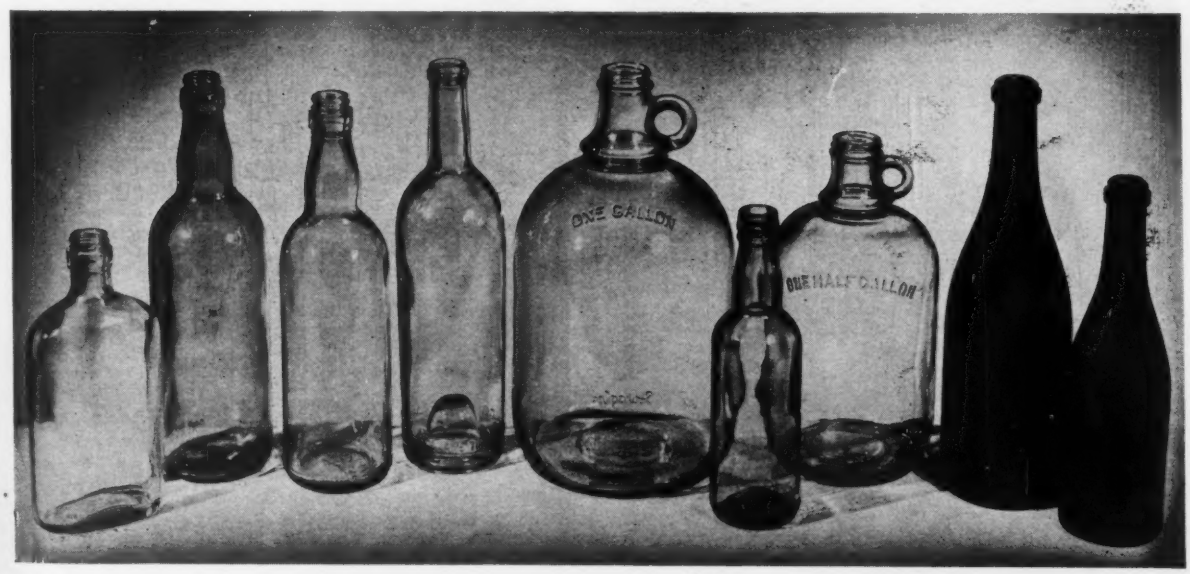
The most challenging problem that will confront industry in the immediate postwar period will be the development and marketing of entirely new products and substitute materials which war conditions have stimulated to an astonishing degree. In many cases, companies already in existence will be expected to produce and market new products. For many such products, new plants and distribution facilities will be required.

Despite the fact that industry is still loyally concentrating on all-out war production, considerable postwar planning is being undertaken. For example, a corporation now turning out explosives will, after the war, produce a new plastic, an improved insecticide, a better soap ingredient and new types of lacquers. An airplane concern is spending a large sum of money on research in plywoods. A large company manufacturing optical goods is planning to produce a domestic freezing unit which may supplant a considerable amount of home canning.

Much has been written and said in recent months about the influence of the present war and the national defense program on packaging trends. Manufacturers and distributors must give consideration to proper packaging in making plans for the future. The cost of distribution of all commodities, old and new, will play an increasingly important part in the selection of specific types of containers for use in packing and shipping. These containers should be selected mainly from the utility and functional standpoint. Future plans for packaging should emphasize the advantages of simplifying the package and packaging operations. It is imperative that those interested in containers and in packaging should coöperate more fully in eliminating as far as possible excessive variety in types, designs, sizes and shapes of containers and packages. Food packing groups and many other groups, including industries such as the cosmetic and toilet goods manufacturers who highly glamorize their products, appreciated the advantages of simplification.

A program of simplification can, and should, be accomplished without interfering with sound package design and without interposing difficulties in the way of orderly progress in the development of sensible types of containers and packages. Interest in the container and package simplification movement is far-reaching, and the cooperative procedures and services of the Division of Simplified Practice of the National Bureau of Standards, U. S. Department of Commerce, are available to any group or industry desiring to establish a sound packaging program through simplification.

Wine containers like these have long been standard. Standardization of package forms is one of the principles of industry-wide simplification which was born before World War I, widely adopted during World War II, may aid reconversion.



Custom packaging

by Harold M. Bowman

When we speak of packaging, most of us take it for granted that the owner of the product is not only the manufacturer, but also the designer and packager. This is true after the package becomes well known and gets into the nationally advertised class. But, even then, there have been many cases in which it has been advantageous to continue to contract for the packaging with a private-brand packager, for as a specialist in his field, his experience is of constant value.

Several of the larger companies specializing in private-brand packaging are well equipped to develop the product and then carry it through all the packaging stages to completion for the market. But, for the purposes of this article, we are mainly interested in the packaging of products owned and produced by the trademark owner.

The private-brand packager performs a unique and vital service for two types of manufacturers. The first one is the small businessman who has a product which he wishes to put on the market, but who lacks the necessary equipment with which to complete the package economically. Without adequate market testing, it is inadvisable for him to consider a capital investment in machinery. He may or may not have had package experience, but he is anxious to market his product with a minimum of changes in design or materials which may often be required by machine operation. Therefore, he is willing to contract for his packaging.

The other type of customer is the large manufacturer who wishes to develop a new product in a test campaign but can't spare the production time on his existing equipment to convert it for small runs of the new product. Like the small manufacturer, he hesitates to purchase new equipment until he has obtained definite indications of the sales potentials of the product. Consequently, both the large and the small manufacturer turn to the private-brand packager with their problems.

The first requirement of a good private-brand packager is that he have sufficient semi-automatic equipment to produce economically and yet be readily converted for packages of different sizes. He must also have a properly trained personnel accustomed to small runs and able to switch quickly and expertly from one job to another. All of us have in our factories many employees who, due to long service with us in working on our particular lines, are expert workers on our packaging lines. But even the best of them would be thrown off their stride if they were suddenly transferred to another company producing entirely different types of packages. But the employees of a private-brand packager are accustomed to constant shifts from one job to another, and are therefore very much more flexible in making quick changes which results in increased efficiency and lower costs.

But, above all, the private-brand packager must have expert production planning to utilize his labor to full advantage and thus be able to produce at lower costs than those obtainable by hand operation. His overhead will

1 and 2. The first requisite for the efficient operation of the custom-packaging plant is a trained personnel, capable of transferring quickly from packaging one product to another. Frequently new operations are evolved by employees.

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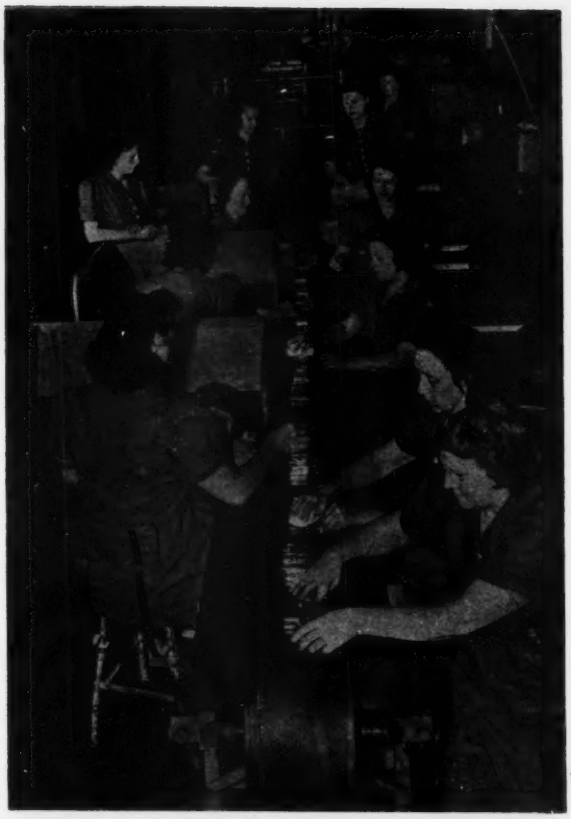
be considerably lower than that of the large manufacturer, a factor which permits him to perform a useful as well as an economical function in this field.

In the field of package design and development, the private-brand packager is in a unique position in that he has had a very broad and comprehensive experience covering many types and styles of packages. Thus he can offer to a prospective customer a very definite protection against the costly errors in design and planning which so often occur in initial packaging by even the largest companies. With few exceptions, the number of nationally advertised products marketed by any one company is usually limited to ten or less, and often these are related lines, all packed in one type of container. Consequently, the company marketing a line of bottled goods would have little or no experience with canned goods, powders, tubes and ointments in metal tubes, etc. Equipment for tube filling and cartoning is expensive and not readily obtainable even in those times of peace which we all hope so fervently will soon return. To attempt to fill and carton even a comparatively small number of tubes by hand for a test campaign will require a considerable amount of trained labor, and will unquestionably result in a high unit cost. The custom or private-brand packager can advise on the size and type of tube for the product, and has equipment for high-speed filling. Although carton machines are not as readily adjusted to handle various sizes, they are usually designed for standard sizes, can be utilized for more than one type of product.

The private-brand packager offers still another advantage in the matter of purchases. He is buying packaging materials such as bottles, cases, tubes, cartons, labels, etc., for his various customers, and he can often combine these orders to obtain lower prices. This is particularly true of labels and cartons where the setup and plate charges are excessive on small runs.

Thus we see the unique and important field covered by these packagers, and although they may often develop the packaging of a product to a point where it is economically practical for the owner to install his own production machinery and package his own product, this very fact is a tremendous advantage to them in securing other accounts. Many a fine product would never have reached nation-wide distribution if it were not for the private-brand packagers who first guided it.

4



5



3. Quick adjustment of the filler spouts will adopt the line to handle bottles of different sizes and shapes. 4. With equal facility, this group handles bottles, paper cans or cartons. 5. Here corrugated containers are filled with unit packages by means of hand operations.

Designing for the production line

by H. F. Brownell

War conditions have greatly altered the nature of various packages with restrictions on the use of metals causing the greatest number of changes.

Package standards of attractiveness and durability have suffered under wartime conditions. The new package may not lend itself to attractive design, the manufacturer may be handicapped by lack of proper equipment and employees, or by Government restrictions on some required material. While the consuming public has tolerated and accepted these conditions as part of war, it will not do so under postwar competition.

Packagers who are able to secure from manufacturers packages of the same shape they formerly used are indeed fortunate since their machinery is, for the most part, adapted to handle one combination only. The primary consideration, of course, is whether or not the container selected will move along the various conveyors without jamming or tipping over. Will it go through the machine to receive its charge of the product? This is generally accomplished by means of star-wheels or rotating tables, and if the present machine will not accept the new container, alteration or complete rebuilding of some parts may be necessary to bring the package to the proper point at which it will receive its load without damaging the container. The newly selected package must be adaptable to the present machinery or the machinery must be readily changed.

The new package usually has a new cover or closure, and this can seldom be adapted to the closing mechanism of the original package, with the result that very often closing operations will have to be performed by hand. So it is the job of the packaging engineer to consider these points and choose a package which, after meeting the requirements of the contents, will require as few changes as possible in the machinery. Still further along the production line, the label must be attached—if it has not been affixed by the container manufacturer. Frequently the labeling machine can be easily altered.

The production facilities of the packaging machinery people have, for the most part, been converted to war work and they have no time for the creation of new parts for their own base machines. Loaded with high-priority work for weeks ahead, they often require priority ratings before accepting what normally would be replacement orders. The result is that the packager has had to do a great deal of improvising.

Producers of large-volume items have been hard hit. They are forced to continue with a reduced staff. Plants where there always was a larger percentage of hand work apparently adapt themselves more easily. In general, the war has made substitute packages more expensive and more difficult to produce. Many packers, therefore, are unwilling to make changes in their machinery that cannot be reconverted.

Production requirements are still a paramount consideration—the most efficient working of the package through the plant. Appearance is not the principal consideration, for often it is found that extra costs have been incurred which could have been prevented by making some minor change in the structure or design.

Floor space can be conserved, for instance, by the selection of collapsible boxes rather than set-up type, and telescope containers also occupy less room than others. In some industries containers, packing material, corrugated cases, etc., are each purchased from different concerns, requiring multiple storage space, while in other industries, such as the bottle industry, one source of supply provides the entire required unit. It is much better if all these items can be obtained from one source of supply.

Objects of production

The chief objects of production are:

1. To assemble in the most efficient manner possible—
   (a) Space is at a premium in most factories and a package should be produced in the least possible amount of floor space.
   (b) Any good production man wants as many units as possible pouring out each hour.
   (c) All supplies should be immediately available.
   (d) Supplies should be on the same floor with the assembly or accessible with little handling.
   (e) Every production man's dream is straight-line production. Production can be in "L" shape or "U" shape and still be straight-line production as long as breaks or bottlenecks are avoided.
2. To produce at the lowest possible cost—
   (a) The production man's basic thought is to be able to assemble a particular package with the least possible amount of labor.
   (b) Waste should be reduced to the minimum.
   (c) Just as important as an even flow of raw material to the packaging lines, is the smooth disposal of finished goods coming from that line. This can be done by chutes or skids on platform trucks, etc.
3. To anticipate future handling of the package—
   (a) One never knows just what the result in sales will be when a familiar package is changed or replaced by a new one. The production man is mindful of this and in his first planning tries to think of what would be necessary should the conditions change.

A production man's bill of specifications

Whenever a new package is created and production is being considered, the production man naturally breaks



Good and bad elements in design considered from the viewpoint of production. For conveying: A. These bottles cannot tip. B. Here a single point of contact will cause breakage. C. High single point of contact, as in this shape, causes tipping. D. Oval shapes tend to turn and wedge while the rectangulars or rounds do not.

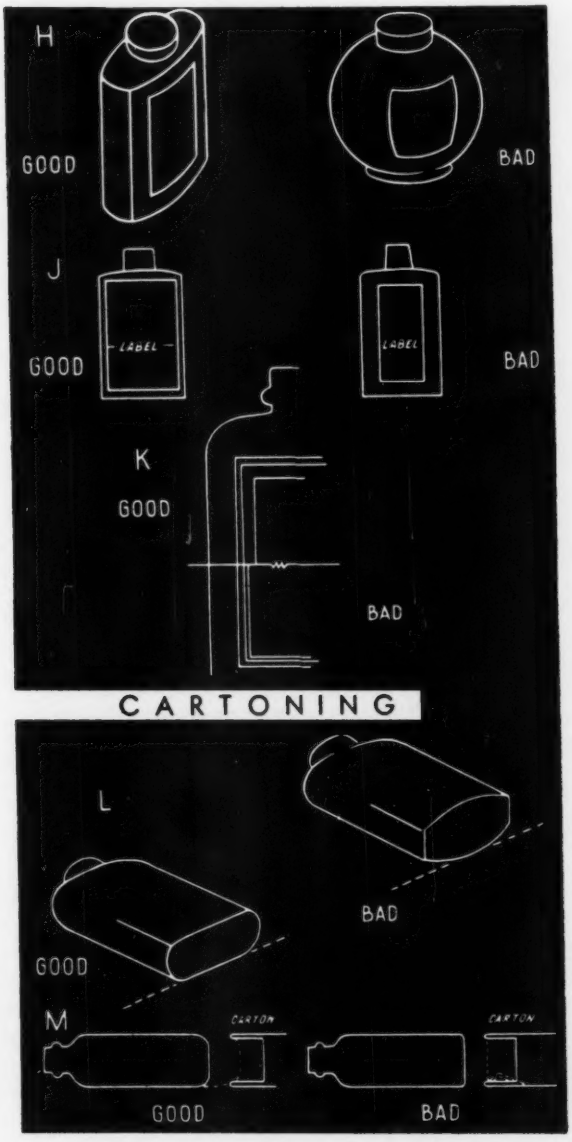
For labeling: E-F-G. Good design avoids the necessity for the hand-locating of packages prior to their labeling. H. A simple curve will present no labeling trouble while a compound curve will offer very great difficulties in this respect. J-K. The bottle should be so designed that the label is easy to spot and slight variations in the spotting should not be noticeable.

For cartoning: L. A flat side which will not rock is most desirable for cartoning. M. Allowing for an ample radius on the base of the container will help it to slide easily and smoothly over the edge of the carton.

this package down into its component parts and makes a study of each to see how it will go through his line.

Choice of container—Of all the components of a package, the container represents the starting point. The following factors are of primary importance to production:

1. No part of the container should be deceptive in appearance.
2. It should be the proper size and shape from the consumer's point of view.
3. It should be of the proper size and shape to move freely along the conveyor.
4. It should not pile up or jam anywhere along the production lines.
5. It should be able to go around curves or be pushed without breaking, chipping or mechanical difficulties.
6. The opening should be large enough for filling.



7. The opening should be convenient for removal of the contents.
8. It should have the proper label space available.
9. It should be constructed sturdily to withstand traffic conditions and be free from breakable parts.
10. It should have no feature which would prevent its being assembled by a fully automatic machine.

The WPB has been alert to the many sizes and shapes of bottles manufactured for various packages, and the Board has done a lot to simplify this situation by the issuing of orders to reduce the number of containers. This has worked out to the advantage of the bottles manufacturers and, in the long run, to the packagers of those bottles.

Choice of label—When a production man sees a label he studies it carefully in its relation to the rest of the package and with the following thoughts in mind:

1. Oddly shaped or freakish labels should be avoided.
2. The label should fit properly into the label space on the container.
3. The back of the label should be of such quality that it will adhere properly to the container.
4. Consideration of a label implies also the adhesive used with it, because the product has to be stored in hot places, cold places, damp places and dry places and it is not unusual for certain types of adhesive to crystallize or become damp and so allow the label to come away from the package. The same type cannot be used for a tin can as for glass, for a varnished surface or for sealing corrugated cases.
5. It must be possible to apply it by machinery.

Choice of closure—The following requirements come into a production man's mind:

1. The closure should fit the container properly.
2. It should make a tight seal, effective over a long period of time.
3. The re-sealing features should be satisfactory from a consumer's point of view.
4. The liner should be of such quality as to withstand deterioration.
5. The liner should not contaminate the product in the container.
6. There should be no feature of the closure which would prevent its being applied and tightened by the usual type of closure machine.

Choice of carton and wrapping material—The following details must be carefully worked out:

1. The carton itself should not be deceptive in size but should fit the container it holds.
2. The carton should be sufficiently heavy to withstand abuse in traffic.
3. All details of construction of the carton should be such that it can be run on the available cartoning machines.
4. The package should be of proper shape and construction to permit wrapping by machinery.
5. Wrapping material should be of the correct type and weight for the purpose.
6. The right type of adhesive or sealing mechanism should be available for the wrapping material.

Choice of packing material—In picking materials:

1. Packing materials should be selected of the proper quality and type to protect the package on its journey to the ultimate consumer.
2. The finished package should comply with all Interstate Commerce Commission regulations.

Machinery

When considering a new package, the production man must visualize the assembly in the factory, giving close attention to the machinery involved.

If there are any lines of machinery in the factory which are not employed to their full capacity, the details of construction of this new package should, if possible, be adjusted to the use of this line of equipment.

Practically all sales start small and then expand—sometimes very rapidly—so when the machinery is being considered for the production of any package, it is important to get some idea from the sales department as to future requirements. If there are certain periods of the year when the package may have greater sales than at other times, this calls for peak production.

The matter is complicated by the fact that so many of the machine tool people who formerly furnished their machines for general industries are now very busy with Government work and deliveries are delayed six months to a year. Further, the shortage of metals in the industry delays manufacture of whole machines and parts.

The purchase of additional machinery should be considered on the following two points:

1. Tools and equipment are absolutely required to produce some articles of commerce. The greater speed of production obtained from machines is required to meet the sales demand. The manufacture of many things would progress very slowly if the operations were done by hand.
2. Considering factory costs—that is, how much will be saved—studies should be made to determine the output of a machine. Management should know the exact cost of making each unit or thousand units by hand and then, if the volume is sufficiently large, it is in a position to state whether the expense of buying the equipment will be offset by labor savings.

As this article is being compiled, it appears that the machine-tool people are catching up in their production. This should make possible, in the near future, the acceptance of new orders for packaging equipment. Many of the substitute packages have defects, and for that reason many manufacturers would not like additional equipment for the substitute packages. Each manufacturer should study his own requirements and make certain that there will be available for him such containers before he places his order for additional equipment.



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Packaging Innovations

OF WARTIME

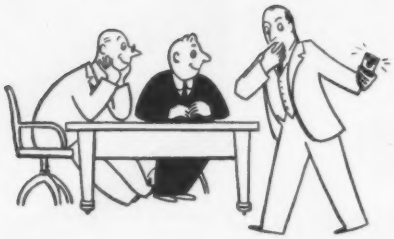
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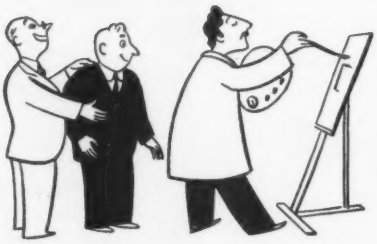
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INTERNATIONAL PRINTING INK

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PACKAGING LAW

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The food, drug & cosmetic act

Most important, most drastic, and the broadest of all laws affecting packaging is the Federal Food, Drug and Cosmetic Act of 1938. In some way or other, this Act affects from 70 to 80 per cent of all packages placed upon the market.

History of the act

The present Act is the most recent of a series of Federal enactments which began with the passage, in 1890, of a law prohibiting the importation into the United States of any sorts of adulterated or unwholesome foods, drugs or liquors.

In 1906, after prolonged discussion, a Food and Drug Act, known as the Wiley Act, was passed and remained in effect until superseded by the present Act. In May of 1933, the first draft of the present Act was submitted to Congress and after several revisions and the taking of thousands of pages of testimony, the present Federal Food, Drug and Cosmetic Act was passed and signed by the President on June 25, 1938. A later bill postponed the effective date of certain mandatory labeling provisions to January 1, 1940, and the effective date of other provisions to July 1, 1940. Since these postponement dates have now been passed, the Act is at present fully in effect.

The Food and Drug Administration, formerly in the Department of Agriculture, was transferred to the Federal Security Agency in 1940. The personnel of the Administration was not changed, however, and continuity of the administrative procedure of its operation has been maintained.

The Food, Drug and Cosmetic Act is a very complex document made further complicated by the multiplicity of rulings and regulations issued under it. It is impossible, therefore, in a general description of the Act, to cover every point that may arise in the repackaging of any given product. The following sections, however, discuss the more general applications of the Act as they affect packaging.

Packagers are advised to consult with the local offices of the Food and Drug Administration or with their attorneys before entering into the production of any package, package part or label which might come under the regulation imposed by the Act.

● PACKAGING PROVISIONS

Packaging provisions of the Act differ slightly in their application to foods, drugs and cosmetics. All three categories of products are covered by a provision against packaging under insanitary conditions which may lead to contamination with filth or may render the product injurious to health. All three categories likewise are covered by a provision against the use of containers composed, in whole or in part, of any poisonous or deleterious substance which may render the contents injurious to health. Failure to conform to either of these provisions constitutes adulteration of the product so packaged.

Containers for all three categories of products must not be so made, formed or filled as to be misleading. Products in such containers are subject to the Act's penalties for misbranding. As an indication of the types of containers falling under this provision, the Chief of the Eastern District of the Food and Drug Administration provided the following list of factors contributing to deceptive packages:

1. Glass Bottles
   a) Thick glass
   b) Panels
   c) Excessive height
   d) Indented bottoms
   e) Irregular shapes
   f) Magnifying shapes
2. Opal Jars
   Same as 1; also raised covers
3. Cardboard, Fibre and Metal Containers
   a) Excessive size (slack-filled)
   b) False bottom
   c) Indented bottom
   d) Raised covers
4. All Types of Containers
   Oversize cartons
5. Facing
6. Deceptive Colored Wrapping
7. Excessive Wrappings
8. False Packing

In any particular instance, it is a question of fact whether or not a container is deceptive, and no iron-clad rules can be laid down. A number of rules or formulas have been proposed to assure compliance with the provisions of the Act covering misleading containers. Best known of these is the so-called Bristol formula for the manufacture of cartons in reduced sizes that more nearly fit tubes of tooth paste.

Manufacturers who pack odd-shaped bottles in cartons have been confronted with the possibility of falling under the deceptive packaging provision because the carton fill often falls as low as 25 per cent. Where the bottle itself is not deceptive, some manufacturers have recently endeavored to correct possible deception in the packages by printing a facsimile of the bottle label on outside of the carton. In the absence of court interpretation, the Administration has not objected to this, pro-

References: See also, "Labels, Seals, Tags and Marking Pieces," page 293.

vided it is done in such a way as to show the exact size of the bottle.

Bottle, shape and color specifications

Another formula, developed by the State of North Dakota in the enforcement of the State Food and Drug Act, is used for determining whether bottles are deceptive. The formula is intended to contrast the true capacity with the apparent capacity, since bottles made of thick glass or with panels sunk in the sides or bottoms or bottles of odd shapes or with long necks appear to the purchaser to have a greater capacity than they actually possess.

North Dakota declared as normal, glass containers appearing $1^1/_2$ times their capacity. That is, if the external volume of the bottles plus the volume of any panels or outside indentation is not more than $1^1/_2$ times the capacity of the bottle, then the containers are considered to be normal. This rule has been applied to 2- and 4-oz. glass bottles.

The Food and Drug Administration has done considerable investigation on bottles of larger size which would indicate that the ratio of apparent size to actual capacity becomes progressively less as the size increases.

The heights of bottles set forth below are over-all heights and represent the distance from the extreme top of the bottle (no stopper) to the bottom by outside measurement. The Food and Drug Administrator has tentatively accepted these heights as satisfactory for the various sizes and the figures may be regarded as the respective maximum permissible heights:

CAPACITY	HEIGHT
oz.	*in.*
$^1/_2$	$3^{13}/_{32}$
$^3/_4$	$3^{21}/_{32}$
1	$4^1/_{32}$
$1^1/_2$	$4^{15}/_{32}$
2	$4^{29}/_{32}$
3	$5^5/_{16}$
4	$5^{29}/_{32}$

Of course, bottles meeting these requirements as to height may be deceptive due to other causes as, for example, irregular shape, undue thickness of glass, indented bottoms and panels.

Many types of deception cannot be covered by formula (or have not to date been covered by formula). The shape of an article may throw the package into the deceptive class as, for instance, in the case of chocolate bars which have been excessively thinned out to provide an extremely large ratio of package face to its weight. Deceptive colored wrapping applies particularly to the use of transparent colored materials as, for instance, the use of an orange transparent film to wrap partially smoked fish. This is interpreted as having the effect of giving the fish a rich color and, hence, the appearance (the deceptive appearance) of being fully smoked.

Powdered products

Manufacturers have had much difficulty with products that settle after packing, such as spices, talcum powder, tooth powder, and the like. A method of measuring the package content of spices, and a minimum content requirement based on the capacity of the container, have been worked out by the American Spice Trade Association. The same requirements are applicable to talcum powder, tooth powder, tea and free-flowing macaroni products, and may later be found to apply to other materials. This is an informal guiding figure which, if met or exceeded, would in the opinion of the Administration constitute a satisfactorily filled package for the products indicated. To meet the requirement the maximum and minimum volumes occupied by two ounces (avoirdupois) are determined by the following so-called

Spice method

Maximum Volume—Roll two ounces of the spice back and forth on a sheet of paper 10 times, fill into a 250-cc. graduated cylinder and note the volume.

Minimum Volume—Vigorously tap the 250-cc. cylinder 100 times and read volume; tap 20 times and again read volume; continue till 20 taps reduce the volume less than 1 cc. and note the final volume. To obtain the proper minimum volume where cosmetic powders are concerned, it is necessary to pound the cylinder vigorously rather than to tap it.

The average volume for any given weight of spice is obtained by direct proportion, using the average of the maximum and minimum volumes of two ounces obtained as indicated above. The per cent of fill is calculated from the average volume occupied by the spice and from the capacity of the container; for example, if the average volume occupied by the spice is 90 cc. and the container has a capacity of 100 cc., then the per cent of fill is 90 per cent.

● PROVISIONS AFFECTING LABELING

The terms "label" and "labeling" are not used synonymously in the Act. The term "label" is defined as a display of written, printed or graphic matter upon the immediate container of any article and a requirement that any word, statement or other information appearing on the label shall not be considered to be complied with unless it also appears on the outside container or wrapper of the retail package of such article or is easily legible through the outside container or wrapper. The term "labeling" means all labels and other written, printed or graphic matter upon any article or any of its containers or wrappers or accompanying such article.

Food-labeling provisions

The food-labeling provisions of the Act fall into 12 rules—two in the form of prohibitions and ten in the form of affirmative requirements:

1. The labeling of a food must not be false or misleading in any particular.
2. A food must not be offered for sale under the name of another food.
3. The label of a food which is an imitation of another food must bear, in type of uniform size

and prominence, the word "imitation" and, immediately thereafter, the name of the food must be imitated.

4. A food in package form must bear a label containing the name and place of business of the manufacturer, packer or distributor.
5. A food in package form must bear a label containing an accurate statement of the quantity of the contents in terms of weight, measure or numerical count. Reasonable variations shall be permitted and exemptions as to small packages shall be established by regulations.
6. If a food purports to be or is represented as a food for which a definition and a standard of identity have been prescribed by regulations, its label must bear the name of the food specified in the definition and standard and, in so far as may be required by such regulations, the common names of optional ingredients (other than spices, flavoring and coloring) present in such food.
7. If a food purports to be or is represented as a food for which a standard of quality has been prescribed by regulations and its quality falls below such standards, its label must bear, in such manner and form as the regulations specify, a statement that it falls below standard.
8. If a food purports to be or is represented as a food for which a standard or standards of fill of container have been prescribed by regulations and it falls below the standard of fill of container applicable thereto, its label must bear, in such manner and form as the regulations specify, a statement that it falls below standard.
9. A food which does not purport to be one for which a definition and a standard of identity have been prescribed by regulations must bear on its label the common or usual name of the food, if any there be and, in case it is fabricated from two or more ingredients, the common or usual name of each such ingredient. Spices, flavorings and colorings, other than those sold as such, may be designated without naming each. Exemptions may be established by regulations to the extent that naming of the ingredients is impracticable.
10. If a food purports to be or is represented for special dietary uses, its label must bear such information concerning its vitamin, mineral and other dietary properties as the administrator determines, and by regulations prescribes as, necessary in order fully to inform purchasers as to its value for such uses.
11. If a food bears or contains any artificial flavoring, artificial coloring or chemical preservative, it must bear labeling stating that fact. To the extent that compliance with this requirement is impracticable, exemptions shall be established by regulations. The requirement with respect to artificial coloring does not apply in the case of butter, cheese or ice cream.
12. Any word, statement or other information required by the Act to appear on the label or labeling must be prominently placed thereon with such conspicuousness (as compared with other words, statements, designs or devices in the labeling) and in such terms as to render it likely to be read and understood by the ordinary individual under customary conditions of purchase and use.

Drug-labeling provisions

The provisions relating to labeling of drugs and devices fall within 14 rules, four constituting prohibitions and ten constituting affirmative requirements:

1. The labeling of a drug or device must not be false or misleading in any particular.
2. A drug must not be an imitation of another drug.
3. A drug must not be offered for sale under the name of another drug.
4. A drug or device must not be dangerous to health when used in the dosage or with the frequency or duration prescribed, recommended or suggested in the labeling thereof.
5. A drug or device in package form must bear a label containing the name and place of business of the manufacturer, packer or distributor.
6. A drug or device in package form must bear a label containing an accurate statement of the quantity of the contents in terms of weight, measure or numerical count. Reasonable variations shall be permitted and exemptions as to small packages shall be established by the proper regulations.
7. A drug which is for use by man and contains any quantity of the narcotic or hypnotic substances named must bear on its label the name, and quantity or proportion of such substance or derivative and in juxtaposition therewith the statement, "Warning—May be habit forming." The named substances are alpha-eucaine, barbituric acid, beta-eucaine, bromal, cannabis, carbromal, chloral, coca, cocaine, codeine, heroin, marihuana, morphine, opium, paraldehyde, peyote, sulphonmethane and any chemical derivative of any such substance which derivative has been designated by regulations as habit forming.
8. The label of a drug which is not designated solely by a name recognized in an official compendium must bear the common or usual name of the drug, if such there be, and in case it is fabricated from two or more ingredients, the common or usual name of each active ingredient, including the quantity, kind and proportion of any alcohol and also including whether active or not, the name and quantity or proportion of any bromides, ether, chloroform, acetanilid, acetphenetidin, amidopyrine, antipyrine, atropine, hyoscine, hyoscyamine, arsenic, digitalis, digitalis glucoside, mercury, ouabain, strophanthin, strychnine, thyroid or any derivative or preparation of any such

substances contained therein. To the extent that compliance with requirements is impracticable, exemptions shall be established.

9. The labeling of a drug or device must bear adequate directions for use, provided that where the requirement as applied to any drug or device is not necessary for the protection of public health, the administrator shall promulgate regulations exempting such item from such requirement.
10. The labeling of a drug or device must bear such adequate warnings against use in those pathological conditions or by children where its use may be dangerous to health, and against unsafe dosage or methods or duration of administration or application, in such manner and form, as are necessary for the protection of users.
11. If a drug purports to be a drug the name of which is recognized in an official compendium, it must be packaged and labeled as prescribed therein, provided that the method of packing may be modified with consent of the Administrator. Whenever a drug is recognized in both the U. S. Pharmacopoeia and the Homeopathic Pharmacopoeia of the United States, it is subject to the requirements of the U. S. Pharmacopeia with respect to labeling unless it is labeled and offered for sale as a homeopathic drug, in which case it is subject to the provisions of the Homeopathic Pharmacopoeia of the United States and not to those of the U. S. Pharmacopoeia.
12. The label of a drug which has been found by the Administrator to be liable to deterioration must bear a statement of such precautions as regulations require as necessary for the protection of the public health.
13. A drug which purports to be or is represented as a drug the name of which is recognized in an official compendium, if its strength differs from, or its quality or purity falls below, the standard set forth in such compendium, must plainly state on its label its difference in strength, quality or purity from such standard.
14. Any word, statement or other information required to appear on the label or labeling must be prominently placed thereon with such conspicuousness (as compared with other words, statements, designs or devices in the labeling) and in such terms as to render it likely to be read and understood by the ordinary individual under customary conditions of purchase and use.

Cosmetic-labeling provisions

Cosmetic-labeling provisions fall within five rules:

1. The labeling of a cosmetic must not be false or misleading in any particular.
2. A coal-tar hair dye which may be injurious to consumers under the conditions of use prescribed in the labeling or under such conditions of use as are usual must bear the following conspicuously:

   Caution: This product contains ingredients which may cause skin irritation on certain individuals and a preliminary test according to accompanying directions should first be made. This product must not be used for dyeing the eyelashes or eyebrows; to do so may cause blindness.

   The labeling of such hair dye must bear adequate directions for such preliminary testing.
3. A cosmetic in package form must bear a label containing the name and place of business of the manufacturer, packer or distributor.
4. A cosmetic in package form must bear a label containing an accurate statement of the quantity of the contents in terms of weight, measure or numerical count. Reasonable variations shall be permitted and exemptions as to small packages shall be established by regulations.
5. Any word, statement or other information required to appear on the label or labeling must be prominently placed thereon with such conspicuousness (as compared with other words, statements, designs or devices in the labeling) and in such terms as to render it likely to be read and understood by the ordinary individual under customary conditions of purchase and use.

An exemption from certain labeling requirements of the Act is provided for cosmetics which are to be processed, labeled or repacked in substantial quantities at establishments other than those where originally processed or packed, provided that such cosmetics are not adulterated or misbranded upon removal from such processing, labeling or repacking establishments. A similar exemption applies to drugs and foods. Small open containers of fresh fruits and fresh vegetables are also exempted by regulations from certain labeling requirements.

Labeling provisions for coal-tar colors

The labeling requirements for certified coal-tar colors are found partly in the Food, Drug and Cosmetic Act, partly in regulations for coal-tar colors. Label should carry:

1. An accurate statement of the net contents of the package, except certain small packages specifically exempted under secs. 403 (e), 502 (b) and 602 (b) of the Act.
2. The name and place of business of the manufacturer, packer or distributor.
3. In the case of mixtures for use in food, the names of the component colors and of each diluent contained in the mixture, or if they bear (a) "Certified Coal-Tar Color" or "Certified Coal-Tar Colors"; and (b) the common name of each diluent therein.
4. The name of the color.
5. The lot number of the batch.
6. The pure dye content of the color.
7. In the case of a color certified for a limited use, a statement setting forth this limitation.

Certain small packages of certified coal-tar colors are exempt from label requirements relative to net contents.

ADULTERATION

Numerous provisions in the law apply to the adulteration of foods, drugs and cosmetics. In most cases these provisions do not affect the packaging operations or the packages themselves, except in so far as the penalty for adulteration involves a confiscation and seizure of packaged products. However, the provisions of the law applying to preparation or holding of foods, drugs or cosmetics under insanitary conditions obviously apply to packaging as well as to processing conditions.

ENFORCEMENT

The Food and Drug Administration is armed with a number of powers to secure the enforcement of provisions and prohibitions contained in the Act. Violation of the prohibited acts, such as the introduction into interstate commerce of adulterated or misbranded foods, drugs or cosmetics is made a misdemeanor under the law. The penalty for such violation is imprisonment for not more than one year or a fine of not more than $1,000 or both. Second offenders are liable to imprisonment for not more than three years or a fine of not more than $10,000. Where intent to defraud or mislead is found, a penalty of three years imprisonment or $10,000 fine or both may be imposed. These criminal provisions, while constituting a big stick behind the door, are perhaps the least utilized of the enforcement procedures provided by the Act. The Administration is empowered to proceed against merchandise as well as against persons. Articles that are adulterated or misbranded and introduced into interstate commerce are liable to seizure by the Administration and, if found by the courts to be adulterated or misbranded, may be disposed of by destruction or sale.

Such drastic proceedings are not, however, undertaken in most cases. The law provides that nothing in the Act shall be construed as requiring the Administration to report for prosecution or to institute libel or injunction proceedings where minor violations of the Act are concerned, provided the Administration believes that the public interest will be adequately served by a suitable written notice or warning.

Far more important to the average manufacturer than the criminal provisions or the seizure and trial provisions of the Act is the fact that failure to conform to the packaging and labeling provisions and consequent action by the Administration may involve the manufacturer in a whole series of extremely expensive package changes and may involve the loss of dealer good will, adverse publicity and a dislocation of production and shipments.

Because of these economic consequences—quite as much as because of the punitive provisions of the law—manufacturers in general should make every effort to insure, in advance, that they achieve a satisfactory degree of compliance with every provision of the Act. To date, the Administration has proceeded only in the more flagrant cases of violation.

STATE AND LOCAL LAWS

Legislatures of the states, through their inherent police power as well as through their Constitutional powers involving the protection of public health and the like, have undoubted rights to pass legislation to protect the public against adulterated and misbranded foods, drugs and cosmetics. The validity of state laws is in no way affected by Federal laws, except where the former are conflicting.

The nature of state statutes differs considerably in the various states. At least 39 states have laws relating specifically to packaging, labeling, adulterating, or misbranding. Several of these have adopted the Federal Food, Drug, and Cosmetic Act of 1938 in its entirety, among them: California, Connecticut, Delaware, Louisiana, New Jersey, North Carolina, Oklahoma, Oregon, Tennessee, Utah, Vermont, and the Territory of Hawaii. Several other states have separate laws for foods and/or drugs and cosmetics, and some have special statutes covering dairy products: Arizona, Alabama, Arkansas, Colorado, Illinois, Indiana, Kentucky, Maryland, Massachusetts, Michigan, Missouri, Minnesota, Nebraska, New Mexico, New York, North Dakota, Rhode Island, and Virginia.

Special state laws

A few have special laws or regulations on container packages, labels, weights and measures: Arizona, Delaware, Florida, Illinois, Iowa, Kansas (newly revised) Maine, Montana, New Jersey (new beverage-container law), North Carolina, Ohio, Pennsylvania, Washington, Virginia, West Virginia, and Wisconsin.

Oregon and Texas have new 1943 laws affecting packaging of insecticides and fungicides, and the latter state also has a new 1943 law prescribing standard package sizes for flour, cereal, etc.

To aid Federal laws

In general, state laws and local ordinances are designed principally to cover products manufactured within the state and sold only within the state (i.e., products outside the reach of the Federal authorities). Although they apply equally to foods, drugs or cosmetics *sold* within the state whether or not (in most instances) the product is manufactured within that state. Thus manufacturers are obliged, in planning new packages, to consider the effect upon package design, label and structure not only of the Federal statute, but of the laws of the states in which the product is to be sold.

Check on state laws

Wherever the market in a given state promises a sizable present or potential sales outlet, the manufacturer will be well advised to check the state law and to attempt to make his package conform with state law requirements which may be more stringent or more restrictive than the Federal law. State requirements cannot relax Federal restrictions which prevail throughout the United States.

THE FEDERAL FOOD, DRUG AND COSMETIC ACT

ADMINISTRATOR OF THE FEDERAL SECURITY AGENCY
Paul V. McNutt

Food and Drug Administration

Commissioner of Food and Drugs: W. G. Campbell
Associate Commissioner: Dr. P. B. Dunbar
Assistant Commissioner: C. W. Crawford
Assistant to the Commissioner: F. B. Linton
Chief Inspector: G. P. Larrick
Interstate Division: L. D. Elliott
Division of State Cooperation: W. A. Queen
Drug Division: R. P. Herwick
Food Division: W. B. White
Microanalytical Division: H. Welch
Division of Pharmacology: H. O. Calvery
Vitamin Division: E. M. Nelson
Bacteriology Division: A. C. Hunter
Cosmetic Division: Dan Dahle

FIELD SERVICE

Eastern District

Headquarters: 1200, U. S. Appraiser's Stores, 201 Varick Street, New York, N. Y.; W. R. M. Wharton, Chief
Atlanta, Ga.: 416, Federal Annex; J. J. McManus
Baltimore, Md.: 800, U. S. Appraiser's Stores, Gay and Lombard Streets; A. T. Retzlaff
Boston, Mass.: 805, U. S. Appraiser's Stores, 408 Atlantic Avenue; H. D. Garrett
Buffalo, N. Y.: 415, Federal Bldg., S. Division and Ellicott Streets; W. H. Heath
Charlotte, N. C.: 233, U. S. Post Office Bldg.; S. T. Grey, resident inspector
Charleston, W. Va.: 342, State Capitol Bldg.; W. R. Moses, resident inspector
Jacksonville, Fla.: 334, U. S. Court House Bldg.; G. R. Fowler, resident inspector
Newark, N. J. (substation): 438, New Post Office Bldg.; M. S. Fisher
New York, N. Y.: 1200, U. S. Appraiser's Stores, 201 Varick Street; McKay McKinnon, Jr., Chief of Station
Norfolk, Va.: 289, Brokers' Exchange Bldg., 264 W. Tazewell Street; J. C. Pearson
Philadelphia, Pa.: 1204, New Custom House, 2nd and Chestnut Streets; C. S. Brinton
Pittsburgh, Pa. (substation): 303, Old Post Office Bldg.; D. F. Fisher
Providence, R. I.: 209 Main Post Office Bldg.; A. E. Ledder, resident inspector
Tampa, Fla.: 117, U. S. Appraiser's Stores, Platt and Water Streets; M. O. Rentz, resident inspector
Waterbury, Conn.: 207, Post Office Bldg.; J. A. Kedzior, resident inspector

Central District

Headquarters: 1222, Post Office Bldg., Van Buren and Canal Streets, Chicago, Ill.; J. O. Clarke, Chief
Chicago, Ill.: 1222, Post Office Bldg., Van Buren and Canal Streets; M. R. Stephens, Chief of Station
Cincinnati, Ohio: 901, Post Office Bldg.; R. S. Pruitt
Cleveland, Ohio: 2, New Post Office; I. I. Herring, resident inspector
Dallas, Tex.: 587, Terminal Annex; L. Johnson, resident inspector
Detroit, Mich.: 943, Federal Bldg.; G. W. Seay, resident inspector
Houston, Tex. (substation): 1018, Federal Office Bldg.; M. Harris
Kansas City, Mo.: 323, U. S. Court House, 811 Grand Avenue; W. H. Hartigan
Memphis, Tenn.: 326, U. S. Custom House; B. T. Melvin, Jr., resident inspector
Minneapolis, Minn.: 209, Federal Office Bldg., Washington and Third Avenues, South; C. W. Harrison
New Orleans, La.: 223, U. S. Custom House, 423 Canal Street; E. C. Boudreaux
Omaha, Nebr.: Room 315, Federal Office Bldg., 15th and Dodge Streets; E. A. Reed, resident inspector
St. Louis, Mo.: 1007, New Federal Bldg., 1114 Market Street; R. S. Pruitt

Western District

Headquarters: 502, Federal Office Bldg., Fulton and Leavenworth Streets, San Francisco, Calif.; J. L. Harvey, Chief
Denver, Col.: 531, U. S. Custom House; W. Vincent
Los Angeles, Calif.: 1401 S. Hope Street; S. A. Roe
Portland, Ore. (substation): 301, U. S. Custom House; Richard Edge
Salt Lake City, Utah: 430, Post Office Bldg.; A. N. Morton, resident inspector
San Francisco, Calif.: 502, Federal Office Bldg., Fulton and Leavenworth Streets; A. J. Brown, Chief of Station
Seattle, Wash.: 501, Federal Office Bldg.; K. E. Monfore
Spokane, Wash.: 415, Federal Bldg.; F. L. Lotsvold, resident inspector

OFFICIALS ADMINISTERING STA

Alabama:—Commissioner, Department of Agriculture and Industries, Montgomery.

Arizona:—Director, State Laboratory, Tucson. State Dairy Commissioner, Phoenix. Secretary of State, Phoenix. Board of Health, Phoenix.

Arkansas:—State Health Officer, Little Rock. Secretary, State Board of Pharmacy, Little Rock.

California:—Chief, Bureau of Food & Drug Inspection, State Department of Public Health, San Francisco. Chief, Bureau of Dairy Service, Division of Animal Industry, State Department of Agriculture, Sacramento.

Colorado:—Food & Drug Division, State Dept. of Health, Denver. State Dairy Commissioner, Denver. State Director of Agriculture, Denver.

Connecticut:—State Dairy & Food Commissioner, Hartford. State Chemist, Connecticut Agricultural Experiment Station, New Haven.

Delaware:—Executive Secretary, Board of Health, Dover. Chemist, State Board of Agriculture, Dover.

District of Columbia:—Health Officer, Washington, D. C.

Florida:—Commissioner of Agriculture, Tallahassee. State Chemist, Tallahassee.

Georgia:—Commissioner of Agriculture, Atlanta. State Chemist, Atlanta. Chief Food Inspector, Atlanta. Chief Drug Inspector, Atlanta.

Hawaii:—Food Commissioner and Analyst, Territory of Hawaii.

Idaho:—Director of Public Health, Boise. State Chemist, Boise.

Illinois:—Director of Agriculture, Springfield. Liquors: Department of Finance, Springfield. Milk: Department of Health, Springfield.

Indiana:—Chief, Bureau of Food & Drugs, State Board of Health, Indianapolis. Chief, Bureau of Dairy Products, State Board of Health, Indianapolis. Commissioner of Weights and Measures, State Board of Health, Indianapolis.

Iowa:—Secretary of Agriculture, Des Moines. Chief, Dairy and Food Division, Department of Agriculture, Des Moines.

Kansas:—Secretary, State Board of Health, Topeka. Assistant Chief Food & Drug Inspector, State Board of Health, Topeka.

Kentucky:—Director, Bureau of Foods, Drugs & Hotels, State Department of Health, Louisville.

Louisiana:—President, State Board of Health, New Orleans. Chief, Food & Drug Section, State Board of Health, New Orleans.

Maine:—Chief, Division of Inspection, Department of Agriculture, Augusta.

Maryland:—State Food & Drug Commissioner, Baltimore. Deputy Commissioner, State Department of Health, Baltimore.

Massachusetts:—Director, Division of Food & Drugs, Department of Public Health, State House, Boston. Director, Division of Standards, State House, Boston.

Michigan:—Director, Bureau of Foods & Standards, Department of Agriculture, Lansing. Director, Bureau of Dairying, Department of Agriculture, Lansing. State Analyst, Department of Agriculture, Lansing. Director of Drugs & Drug Stores, State Board of Pharmacy, Lansing. Director, Bureau of Fruit & Vegetable Inspection, Department of Agriculture, Lansing.

Minnesota:—Commissioner, Department of Agriculture, Dairy & Food, St. Paul. Chief Bacteriologist, Department of Agriculture, St. Paul. Chief Chemist, Department of Agriculture, St. Paul.

Mississippi:—Commissioner of Agriculture and Commerce, Jackson. State Chemist, State College.

OFFICIALS ADMINISTERING STATE REG

Alabama:—Commissioner, Department of Agriculture and Industries, Montgomery.

Arizona:—Director, State Laboratory, Tucson. State Dairy Commissioner, Phoenix. Secretary of State, Phoenix. Board of Health, Phoenix.

Arkansas:—State Health Officer, Little Rock. Secretary, State Board of Pharmacy, Little Rock.

California:—Chief, Bureau of Food & Drug Inspection, State Department of Public Health, San Francisco. Chief, Bureau of Dairy Service, Division of Animal Industry, State Department of Agriculture, Sacramento.

Colorado:—Food & Drug Division, State Dept. of Health, Denver. State Dairy Commissioner, Denver. State Director of Agriculture, Denver.

Connecticut:—State Dairy & Food Commissioner, Hartford. State Chemist, Connecticut Agricultural Experiment Station, New Haven.

Delaware:—Executive Secretary, Board of Health, Dover. Chemist, State Board of Agriculture, Dover.

District of Columbia:—Health Officer, Washington, D. C.

Florida:—Commissioner of Agriculture, Tallahassee. State Chemist, Tallahassee.

Georgia:—Commissioner of Agriculture, Atlanta. State Chemist, Atlanta. Chief Food Inspector, Atlanta. Chief Drug Inspector, Atlanta.

Hawaii:—Food Commissioner and Analyst, Territory of Hawaii.

Idaho:—Director of Public Health, Boise. State Chemist, Boise.

Illinois:—Director of Agriculture, Springfield. Liquors: Department of Finance, Springfield. Milk: Department of Health, Springfield.

Indiana:—Chief, Bureau of Food & Drugs, State Board of Health, Indianapolis. Chief, Bureau of Dairy Products, State Board of Health, Indianapolis. Commissioner of Weights and Measures, State Board of Health, Indianapolis.

Iowa:—Secretary of Agriculture, Des Moines. Chief, Dairy and Food Division, Department of Agriculture, Des Moines.

Kansas:—Secretary, State Board of Health, Topeka. Assistant Chief Food & Drug Inspector, State Board of Health, Topeka.

Kentucky:—Director, Bureau of Foods, Drugs & Hotels, State Department of Health, Louisville.

Louisiana:—President, State Board of Health, New Orleans. Chief, Food & Drug Section, State Board of Health, New Orleans.

Maine:—Chief, Division of Inspection, Department of Agriculture, Augusta.

Maryland:—State Food & Drug Commissioner, Baltimore. Deputy Commissioner, State Department of Health, Baltimore.

Massachusetts:—Director, Division of Food & Drugs, Department of Public Health, State House, Boston. Director, Division of Standards, State House, Boston.

Michigan:—Director, Bureau of Foods & Standards, Department of Agriculture, Lansing. Director, Bureau of Dairying, Department of Agriculture, Lansing. State Analyst, Department of Agriculture, Lansing. Director of Drugs & Drug Stores, State Board of Pharmacy, Lansing. Director, Bureau of Fruit & Vegetable Inspection, Department of Agriculture, Lansing.

Minnesota:—Commissioner, Department of Agriculture, Dairy & Food, St. Paul. Chief Bacteriologist, Department of Agriculture, St. Paul. Chief Chemist, Department of Agriculture, St. Paul.

Mississippi:—Commissioner of Agriculture and Commerce, Jackson. State Chemist, State College.

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STATE REGULATORY LEGISLATION

Missouri:—State Health Commissioner (Food & Drug Laws), Jefferson City. Commissioner of Agriculture (Dairy, Ice Cream, Egg Laws), Jefferson City.

Montana:—Director of Foods & Drugs, Department of Public Health, Helena. Division of Dairying, Department of Agriculture, Labor & Industry, Helena.

Nebraska:—Director, Department of Agriculture and Inspection, Lincoln. Chief, Bureau of Dairies (Foods and Weights and Measures), Lincoln.

Nevada:—State Food & Drug Commissioner, Reno.

New Hampshire:—Director, Division of Chemistry & Sanitation, State Board of Health, Concord. Commissioner, Weights & Measures, Concord.

New Jersey:—Chief, Bureau of Foods & Drugs, State Department of Health, Trenton. Chief, Bureau of Chemistry, State Department of Health, Trenton.

New Mexico:—Director of Public Health, Santa Fe. State Dairy Commissioner, State College.

New York:—Commissioner, Department of Agriculture & Markets, Albany. Director, State Laboratory, Albany. Secretary, State Board of Pharmacy, State Education Building, Albany.

North Carolina:—Commissioner of Agriculture, Raleigh. State Chemist, Department of Agriculture, Raleigh.

North Dakota:—State Food Commissioner & Chemist, Bismarck. State Dairy Commissioner, Bismarck.

Ohio:—Director, Department of Agriculture, Columbus 15. Chief, Division of Foods & Dairies, Department of Agriculture, Columbus 15.

Oklahoma:—State Commissioner of Health, Oklahoma City.

Oregon:—Director, Department of Agriculture, Salem. Chief, Division of Foods & Dairies and Weights & Measures. Chief Chemist, Department of Agriculture, Salem.

Pennsylvania:—Director, Bureau of Foods & Chemistry, Department of Agriculture, Harrisburg. Secretary, State Board of Pharmacy, Harrisburg.

Rhode Island:—Chief, Division of Food and Drug Control, State Department of Public Health, Providence.

South Carolina:—Commissioner of Agriculture, Columbia.

South Dakota:—Secretary, Dept. of Agriculture, Pierre. State Chemist, Vermillion.

Tennessee:—Commissioner of Agriculture, Nashville. Superintendent, Division of Foods, Fertilizers, Dairies, Department of Agriculture, Nashville.

Texas:—Director, Food & Drug Bureau, State Board of Health, Austin. Department of Agriculture, Austin.

Utah:—State Board of Agriculture, Salt Lake City.

Vermont:—Secretary, State Board of Health, Burlington.

Virginia:—Commissioner of Agriculture & Immigration, Richmond. Director, Dairy & Food Division, Department of Agriculture & Immigration, Richmond. Chief Chemist, Department of Agriculture & Immigration, Richmond. Secretary, State Board of Pharmacy, Richmond.

Washington:—Supervisor, Food & Drug Division, State Department of Agriculture, Olympia. State Board of Pharmacy, Olympia.

West Virginia:—Commissioner of Health (Foods and Drugs), Charleston. Commissioner of Agriculture (Foods), Charleston.

Wisconsin:—Director, State Department of Agriculture, Madison. Chief, Dairy Division, State Department of Agriculture, Madison. Supervisor of Food Inspection, State Department of Agriculture, Madison. Chief Inspector of Weights and Measures, State Department of Agriculture, Madison.

Wyoming:—Acting Commissioner, Department of Agriculture, Cheyenne. State Chemist, Laramie.

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Special federal regulations

In certain industries and when they are shipping through certain channels, packagers are required to conform to the rules and regulations of both the Government agencies and the semi-official organizations representing such groups as the railroads or the motor freight carriers. The new and the more important of these regulations are discussed here. More detailed data should be obtained from the organization having jurisdiction in the case.

LABELING OF WOOL PRODUCTS

One of the most important new statutes is the Wool Products Labeling Act of 1939, which became effective July 15, 1941. Under its rules and regulations every wool product subject to the Act must be marked by a stamp, tag, label or other means of identification in conformity with its requirements.

The information on the identification must include the fibre content of the product, the maximum percentage of any non-fibrous loading, filling or adulterating matter, in the total weight of the product, and the name of the manufacturer, or of a person subject to Section 3 with respect to the product.

Such name need not appear upon the label if it bears an identification number registered and assigned by the Federal Trade Commission as the mark that identifies the manufacturer and by which the latter is bound as fully as though his name were used provided that in addition to this number, the label or mark of identification bears the name of at least one seller, whether retailer or other seller. The name of the seller, together with the manufacturer's registered number and the content information, should remain on the label until it is delivered to the consumer.

To use a registered number instead of his name upon the label or mark of identification on his product, a manufacturer may make application to the Federal Trade Commission. The Commission will assign to him such registered number or numbers as are appropriate for his use and suggest the form for the label or mark.

Such application to the Commission must be made in writing, duly executed under oath or affirmation, and must be submitted in quadruplicate in a special approved form. Blanks for this purpose are not furnished by the Commission, but the text of the form is given in Regulations which may be obtained from the Commission.

The application must be accompanied by a statement of the business conducted by the applicant and designation of the kinds of products he manufactures or sells.

The stamp, tag, label or other identification, must be appropriate to the nature of the product and must be affixed securely enough to remain on the product in good condition throughout the sale, distribution and handling of the product until it is delivered to purchaser. The required information may be stenciled, imprinted or branded upon the product itself, or attached to it in the form of a strong, durable tag securely tied to it.

The label or other mark of required information must be affixed to and displayed on the container, wrapper, binder or other means of packaging of wool products:

1. Where marking the product itself is impossible, or where such marking would be inadequate to give consumers the required information or to prevent deception.
2. Where the wool products are marketed or sold and delivered in a container that remains intact until after it is delivered to the consumer. If possible the packaged product must also be marked appropriately to show the required content of fibre and material, especially if it is likely to be removed from the sealed container or the container is to be opened for purposes of display, sales or other reasons, before it is purchased. Where the product bears a label or mark of identification which is clearly visible to the purchaser when offered for sale, no label or mark of identification need be placed on such container.

LIQUOR PACKAGES AND LABELS

The Alcohol Tax Unit of the Bureau of Internal Revenue of the Treasury Department of the United States is charged with the administration of laws and regulations concerning distilled spirits, wines, fermented malt beverages, cereal beverages, industrial alcohol and related products. Under these, the Bureau regulates the size, marking, use and re-use of containers designed or intended for use for the sale and resale of distilled spirits. The regulations governing the production, blending and bottling of alcoholic beverages are many and varied. The following pamphlets are available from the Superintendent of Documents, Washington, D. C.:

No. 4.* Labeling and Advertising of Wine.
No. 5.* Labeling and Advertising of Distilled Spirits.
No. 6. Bottling of Distilled Spirits in Bond.
No. 7. Relative to the Production, Fortification, Tax Payment, etc., of Wine.
No. 7.* Labeling and Advertising of Malt Beverages.
No. 11. Bottling of Tax Paid Distilled Spirits.
No. 13. Traffic in Containers of Distilled Spirits.
No. 15. Rectification of Spirits and Wines.

The wine brand label must bear:

1. Brand name.
2. Class and type.
3. Name and address of bottler or importer, preceded by the phrase "Bottled by" or "Imported by" as

* These regulations were issued pursuant to the provisions of the Federal Alcohol Administration.

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the case may be, except that such information may appear on a separate strip label, front or back, if the name and address of the person for whom the product is bottled, preceded by the phrase "Bottled for," or "Distributed by," is on the brand label.

4. The alcoholic content by volume is required under the provisions of the Federal Alcohol Administration Act only on labels of wine containing more than 14% of alcohol by volume. However, Internal Revenue Regulations 7, 11 and 15, described above, require statements of alcoholic content, by volume, on labels of all wines bottled on bonded winery, bonded storeroom, taxpaid warehouse, or rectifying premises.
5. The net contents, unless such statement is blown or branded in the container.

On the distilled spirits brand label the mandatory information requirements are as follows:

1. Brand name.
2. Class and type.
3. The names and address of the distiller, rectifier, bottler or importer, preceded by the phrase "Distilled by," "Blended by," "Made by," "Prepared by," "Manufactured by," or "Imported by," whichever may be applicable. If, however, the name and address of the retailer or distributor, preceded by the phrase "Bottled for," or " Distributed by," appears on the brand label, the foregoing mandatory "Name and Address" information may appear on a separate label, front or back.
4. The age of brandy, if less than two years old.

On the Government label—Unless all of the mandatory information (including the following) appears on the brand label, a separate back label known as the Government label, bearing the following information, must be used:

1. Class and type.
2. Alcoholic content by proof, except in the case of cordials and liqueurs and specialties, when the alcoholic content may be in volume percentage.
3. Net contents, unless blown in the bottle.
4. Age or storage statement (in the case of whiskey, or one of the varieties of straight whiskies) and percentages (in the case of blended whiskies or blends of straight whiskies).
5. Percentage of neutral spirits (when required) and name of commodity from which distilled.
6. Artificial or excessive coloring (if used).
7. The state of distillation (in the case of whiskey or any of the varieties of straight whiskey).

It should be noted that although only labels affixed to bottles of distilled spirits introduced in interstate or foreign commerce are subject to the labeling provisions of Regulation No. 5, similar labeling requirements are contained in Regulation No. 13, which are applicable to all distilled spirits packaged for sale at retail, irrespective of whether or not such spirits are intended for introduction into interstate or foreign commerce.

On the malt beverage brand label—In the case of malt beverages, the following label information is required to appear on the brand label:

1. Brand name.
2. Class and type.
3. Name and address of the brewer or bottler. In addition, the name and address of a distributor or retailer, preceded by "Distributed by" or "Bottled for" may appear on the brand or back label.
4. Alcoholic content statements may not appear unless specifically required by state law.
5. Net contents.

Generally speaking, all of the labeling regulations under the Federal Alcohol Administration Act provide the following requirements: contrasting background, size of type, English language, location of label, labels firmly affixed, additional information on labels, representations as to materials.

The regulations also provide for the submission to the Bureau of full and accurate statements of composition when required.

Additional alcohol regulations

The regulations also list certain prohibited practices such as the simulation of Government stamps, the use of misleading statements and statements relating to curative or therapeutic effects.

The Federal Alcohol Administration Act provides also for the issuance of certificates of exemption from label approval, if the bottler, producer, blender or wholesaler of wine is able to show to the satisfaction of the Bureau that the alcoholic beverages to be bottled will not be sold, or offered for sale, or shipped, or delivered for shipment or otherwise introduced in interstate or foreign commerce. The Statute provides, further, that alcoholic beverages may not be bottled or introduced into commerce unless the bottler has in his possession either a certificate of label approval or certificate of exemption from label approval covering the labels used in such bottling operations. Applications for certificates of label approval (Form 1647) or exemptions from label approval (Form 1648) may be obtained from the local office of District Supervision, Alcohol Tax Unit.

Detailed information as to the requirements of the various regulations governing the labeling of distilled spirits, wine and malt beverages, may be obtained from the Alcohol Tax Unit, Bureau of Internal Revenue, Treasury Department, Washington, D. C.

Regulations 5 and 13 prescribe standard sizes for liquor bottles. They are: 1 gal., 1/2 gal., 1 qt., 4/5 qt., 1 pt. and 1/2 pt. In addition, 4/5 pt. containers are permissible for bottling Scotch and Irish whiskies, and Scotch and Irish type whiskies, as well as brandy and rum. Regulation 5 also provides for standard size containers of specified sizes of less than 1/2 pt.

The regulations also provide for the application of tax stamps over the mouth of each bottle of distilled spirits, or compounds containing distilled spirits and on certain types of wines. Stamps may not be concealed or obscured. The Internal Revenue Regulations also provide

for the manner of affixing stamps on bottles, as well as stamps and markings on cases and barrels.

Additional Federal Statutes

Under the Wheeler-Lea Act, an amendment of the Federal Trade Commission Act passed in March of 1938, the Commission was given more effective powers of control over false advertising of foods, drugs, devices, and cosmetics. Detailed information may be obtained from any office of the Commission.

There are a number of statutes, relating to foods, viruses, serums, toxins, insecticides, etc., that fall under the jurisdiction of the Food and Drug Administration: the Filled Milk Act, the Import Milk Act, the Tea Importation Act, and the Federal Caustic Poison Act, together with the following which relate specifically to the Federal Food, Drug and Cosmetic Act: the Act of March 4, 1923, defining butter and providing a standard therefor; the Act of July 24, 1919, defining wrapped meats as in package form; and the Seafood Act of August 27, 1935. The Department of Agriculture administers the Insecticide Act.

● POSTAL DEPARTMENT REGULATIONS

The Post Office Department has prescribed regulation as to the preparation, wrapping and packing of parcel-post or fourth-class mail matter. These regulations are contained in Circular 3 of the Division of Classification, available through any postmaster and in circular issued by the Second Assistant Postmaster General, entitled "Preparation, Wrapping and Packing of Mail Matter."

Examination—Fourth-class matter must be so packed that the contents may be examined easily by postal officials. When not so packed, or when it contains writing not authorized by law, first class postage is needed.

Nailed boxes—Parcel-post mail may be enclosed in the boxes of which the lids can be readily removed with a chisel or screw driver for examination of contents.

Containers and packing—All matter must be securely packed and wrapped or packed in a strong container so as to bear transmission without breaking or injuring the mail bags, their contents or the persons handling them.

Containers previously used for shipping high explosives having a liquid ingredient (such as dynamite) must not be used for shipments of any article by parcel post. Containers which have been used for the shipment of other high explosives must have all marks removed before shipment by parcel post.

Harmful articles not absolutely excluded from the mails, but which, from their form or nature, might, unless properly secured, destroy, deface or otherwise damage the contents of the mail bag or harm the person of anyone engaged in the postal service, may be transmitted in the mails only when packed in accordance with the postal regulations.

Pyroxylin plastics (celluloid, fiberloid, pyralin, viscoloid, zylonite, etc.), in sheets, rods or tubes, must be packed in strong spark-proof wooden boxes and to each parcel must be attached the diamond-shaped yellow caution label described in Section 588, Postal Laws and Regulations.

As an exception to the above, pyroxylin sheets in packages not exceeding one-half inch in thickness may be packed in containers made of two thicknesses of strong double-faced corrugated fibreboard and small quantities may be shipped in strong strawboard tubes lined with single-faced corrugated strawboard .02 in. thick.

Admissible liquids and oils in packages not exceeding the limit of weight of fourth-class matter will be accepted for mailing when intended for delivery at the office of mailing, or on a rural route starting therefrom, when enclosed in securely closed containers, provided it is not necessary to ship by steam or electric railways.

Admissible liquids and oils, pastes, salves or other articles easily liquefiable shall be accepted for mailing, regardless of distance, when they conform to the conditions prescribed by Section 590, Postal Laws and Regulations, which may be consulted at any post office.

Mailable liquids in tightly-closed metal containers in quantities of 1 gallon or more shall be accepted for mailing when suitably boxed or crated to be dispatched outside of mail bags and labeled "Fragile—liquid. This side up," but when in extra-strong metal containers, the boxing or crating may be omitted.

Fragile articles—Articles easily broken must be securely packed in wooden or strong double-faced corrugated fibreboard boxes with ample cushioning material of excelsior, crushed paper or the like, completely surrounding each article to prevent damage. All such parcels must be labeled "Fragile."

Perishable articles must be marked "Perishable" and it is advisable that they be sent as special delivery matter by affixing stamps for the special delivery fee in addition to the regular postage, thus expediting their delivery. Articles likely to spoil within the time reasonably required for transportation and delivery will not be accepted by post office authorities for mailing.

Unmailable matter—All matter is unmailable which is of a harmful nature, such as poisons, explosives and corrosive articles, etc.

Further information may be obtained from:

Third Assistant Postmaster General, Division of Classification: for rules on the classification and admissibility of matter as parcel-post mail, rates of postage, limit of weight and size, manner of addressing and wrapping so as to permit examination, permissible enclosures and additions, attaching communications to parcels, etc., and for additional copies of Circular 3.

Third Assistant Postmaster General, Division of Registered Mails: for rules on the insurance, C.O.D. (including demurrage charge) and registry features.

Second Assistant Postmaster General, Division of Railway Mail Service: for rules on the admissibility to the mails and wrapping and packing of matter which from its form or character would be liable to injure the mails or the person of postal employees.

Package & trademark protection

Through the use of patents, trademarks or copyrights, a manufacturer introducing a new package may avail himself of a degree of protection.

Package constructions are patentable under the same terms as are all other new and useful inventions. Such patents are issued by the United States Patent Office for terms of 17 years with renewal provisions. It is advisable, whenever the question of patenting a packaging development is to be considered, to consult an experienced patent attorney.

If the design of the package or container is new and ornamental, a design patent may also be secured. Design patents are for terms of $3\frac{1}{2}$, 7, or 14 years, depending upon the term applied for and the fee paid.

The underlying principle of the trademark law of the United States is priority of use. That is, the first user of a trademark or brand name is its rightful owner, and the courts will uphold his rights regardless of whether or not he has registered the mark in the United States Patent Office. This is also the basic principle of the British law. In contrast with that principle, many other countries—notable those of South and Central America—base their trademark protection on priority of registration. Some make registration mandatory.

Most of our individual states have trademark statutes providing for state registration, but up to the present, none of these state laws make registration mandatory. In several instances, when such mandatory legislation was pending, *Printer's Ink* crusaded successfully against its passage. Instances are Nevada, New York, Maryland, New Jersey, Rhode Island, Kentucky and New Mexico. In the opinion of many merchandisers, these state laws are an unnecessary barrier that interferes with the free movement of packaged goods in interstate commerce. It is claimed by those who protest against these laws that they spring from two sources: (1) State legislatures that find it difficult to resist the revenue opportunity, and (2) trademark consultants who thrive on the legal practice involved in obtaining state registration. Interesting in this connection is the fact that the Association of State Secretaries of State has passed resolutions condemning such laws. Whatever the merits of the case, the fact remains that these state laws are in force.

Trademarks

A trademark protects the name or symbol under which an article of merchandise is sold. The United States Patent Office provides facilities for registration of trademarks—that is, names or symbols or a combination of both—used by manufacturer to identify a particular product. This protection applies only to articles used in interstate or foreign commerce. The mark must be one which is still available for use as determined by having a search conducted through the registered and published marks in the Trade Mark Div., United States Patent Office.

There are many cases of trademarks in use by manufacturers who have secured neither Federal nor state registration of the mark. In this event, the manufacturer who seeks to register his mark can ascertain only whether or not such an unregistered mark is in use by his own observations in the particular field or by consulting with experts in that field.

In this connection, it should also be borne in mind that even if the Patent Office considered the mark registrable and passes it to publication, any persons, firms, etc., who may deem themselves injured by the granting of the registration, may file an opposition, whereupon evidence may be presented and a decision rendered by the proper tribunals of the Patent Office.

Even after a registration has been passed to issue by the Patent Office, and the registration has been issued, a petition for cancellation may be filed by any persons, firms, etc., who may deem themselves injured by the registration, and procedure similar to that in filing oppositions is then to be followed.

Many manufacturers and laymen believe that once they secure a Federal Trade Mark Registration, their rights are fully protected and nothing further need be done. However, the Government, of its own initiative, will take no steps to halt an infringer of a patent or trademark. It is incumbent upon the owner of the infringed patent or trademark to bring suit in Federal Court.

Copyright registration

Labels, cartons designs, displays, etc., may be copyrighted provided they are artistic creations used in the sale of goods. Such copyrights are for a period of 28 years and may be renewed for 28 years, and must be originally published with notice of copyright. A label or print is considered published when it has been printed ready for use.

A label must be something attached to the goods, as by pasting onto the container. Cartons, cans, wrappers, etc., are classed in this category and may be registered in their entirety when submitted in flat form. A print cannot be attached to the goods, but must be used to advertise them; advertisements in magazines, street car cards, displays, etc., make up this group. Copyright gives the owner the right to sue directly in Federal courts to obtain damages fixed by law.

There are instances, also, in which prints, pictorial illustrations, pamphlets, etc., may be copyrighted in the Copyright Division of the Library of Congress. But this type of copyright, though more economical, must not be confused with the Patent Office copyright.

To secure copyright register, the user first applies a copyright notice to the object to be covered by copyright. Application is then made to the Patent Office.

Package & trademark trespassing

by L. W. Mida

A manfacturer introducing a new package would be less likely to trespass upon another manufacturer's design or trademark if he had a better knowledge of what constitutes "unfair competition." Usually it is the lack of that knowledge, rather than malicious intent, that creates the fault. Knowing what is condoned or condemned by the courts should assist honest intentions.

It is natural to assume that a reasonable amount of difference in the design of packages and trademarks should be sufficient to avoid trouble, but what is considered "reasonable" by some might prove the contrary in the light of decisions. To avoid the dangerous crossing of the border is largely a matter of common sense. The purpose here is to assist good judgment by some examples of citations in court decisions. Some of these citations may not be perfect guides, but at least they point the way for broad guidance.

Package trespassing

The title "package" comprehends any container or covering, including wrappers and labels. Invasion of any of these is governed by the same simple underlying principles. The ruling question is whether the average buying public—known to be extremely lax in recalling the exact appearances of anything—is likely to be confused in normal purchasing. Having this one point well in mind and following it literally will save much litigation. A mistake is often made in trying to compromise on minor changes in color schemes and other details which, when examined closely, might seem sufficient. The average person, however, usually does not examine objects closely. The origination of packages in the modern trend has created a fine art of distinctiveness and attractiveness, which offers wide latitude in the avoidance of similarities. Today, there is no valid excuse to cut corners in resemblances. Trade papers have greatly helped manufacturers to overcome the problems of infringement by publishing new patterns in design. This substantial service points directly to the marketing advantages of a package that is outstanding in its entirety, and in itself assures immunity from involvement in any infringements.

Color differences

While there can be no monopoly of colors as such, the abuse, not the use, of these eye-catching combinations is the seat of much trouble. There is a popular notion that the transposing of color features removes reason for complaint, overlooking the fact that where a dominating color gives exclusiveness to design, there is a property right in such exclusiveness. Virtually every suit on the grounds of "colorable imitation" finds the defendant inviting a court opinion through lack of regard for this basic index.

Copyright legality

The benefits of copyright are well recognized. However, manufacturers commonly make the mistake of neglecting to apply for copyright at the legal time. That time is properly upon the first production of the package, wrapper or label, not just any time in later years whenever the spirit moves. To wait until the goods have been on the market for a considerable period before obtaining the copyright certificate might prove a boomerang. If evidence proves non-compliance with the letter of the copyright law, the copyright might be held illegal and vacated in a court test. Such lack of foresight can defeat what might otherwise be an entirely meritorious case of alleged imitation.

Unfair competition

Under this sweeping head may be gathered a multitude of complaints, the most conspicuous and numerous being those that embody trademarks as expressed by brand names. What constitutes trespassing in brand name only can best be illustrated by actual findings. When dealing with the three tests customarily applied—i.e., similarity of sound, appearance and meaning—these opinions usually are soundly rendered. When other distinguishing features are added, such as similarities in the actual package, together with representations made in selling, either in the accompanying literature or by word-of-mouth, the cases become more complex. The more involved the issue, the greater the margin for doubt, unless the complaint is clearly justified to the most casual observer. Where there is a strong element of doubt, the court wisely takes into account the measure of popularity created by the original claimant, and views the infringement in the light of probable damage to that established popularity. This is held to constitute unfair competition in the invested property.

Trademarks held confusingly similar

"PEPTO SELTZER" and "PEPSIMIC SELTZER AMELOTTE": The Pepsodent Co. vs. Pepsimic Seltzer Co. (26, C.C.P.A.-1210, 103F [2d] 362). While "Pepsimic Seltzer Amelotte" is descriptive and is registered under the 1920 Act, the use of descriptive marks may form the basis of an opposition. This is distinguished from the "Alka Seltzer" vs. "Pepso Seltzer" case in that, here, the marks as a whole are confusingly similar.

"MEADOW GOLD" and "OLD MEADOW": Abell vs. Beatrice Creamery Co. (23, C.C.P.A., 735; 79F [2] 751). The marks, except in the arrangement of the words and the absence of the letter "G" in appellant's mark, are identical; goods the same.

"DOBRY'S SUNSWEET" and "SUNSWEET": California Prune and Apricot Growers Assn. vs. Dobry Flour Mills, Inc. (26, C.C.P.A.-910; 101F [2d] 838). "Sunsweet" in appellee's mark printed in larger type than the word "Dobry's," the words being associated with a representation of the sun, all inclosed within an elaborate border. The Court said: "We have no hesitation in holding that the marks are confusingly similar, and that the appellant has been damaged by the registration of appellel's mark. To hold otherwise would make it possible for one to appropriate a trademark which, through extensive advertising, had become a household word, by adding thereto the name of an individual."

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"SOLVEX" and "NO-VEX": Albert I. Falls, doing business as Falls Chemical Company vs. The Scholl Mfg. Co., Inc., (24, C.C.P.A., 1308 (90F (2d) 499). While it appeared that the word "Scholls" was printed on the opposer's labels as a prefix to the word "Solvex," the latter word was the dominant feature of such labels, and some purchasers would call for "Scholl's Solvex", while others would ask simply for "Solvex."

"SUNNY MIST" and "SUNKIST:" Florida Citrus Growers Cooperative vs. California Fruit Growers Exchange (25, C.C.P.A.-963; 95F [2] 512). Goods of same descriptive properties but specifically different, one being *canned* citrus fruit and juices for food purposes, and the other fresh citrus fruits and by-products. This decision turned on the similarity of sound of the two marks. Further, there was some similarity in appearance in the use of a large "S" in both marks.

"E-Z" and "KLAD-EZEE:" E. Z. Mills, Inc., vs. Martin Brothers Co. (25, C.C.P.A.; 992–95F [2d] 269). While the marks, tested by appearance alone, are not confusingly similar, a very different impression is made when the sound is compared. That similarity in sound alone is sufficient to constitute confusing similarity between marks is well established.

Trademarks not confusingly similar

"ALKA-SELTZER" and "PEPSO-SELTZER": Miles Laboratories Inc., vs. The Pepsodent Co. (26, C.C.P.A.-1272; 104F [2d] 205). The arbitrary terms "Alka" and "Pepso" are the dominant portions of the respective trademarks. "Seltzer," in each mark, is descriptive and. therefore, public juris, and cannot indicate origin.

"SPIRALATOR" and "ROLLATOR": Borg-Warner Corp. vs. Easy Washing Machine Corp. (26, C.C.P.A., 1256; 104F [2d] 1256). Goods specifically different (refrigerators and washing machines), but Court found it not necessary to determine whether or not they were goods of same descriptive properties, in view of wide difference in marks.

"VAPEX" and "VICKS," or "VAPORUB": Vick Chemical Co. vs. Thomas Kerfoot and Co., Ltd. (23, C.C.P.A.–752; 80F [2F] 73). "Vicks" and "Vapex" have only the initial letter in common and while they terminate with the same sound, they are clearly distinguishable in that one has only one syllable while the other has two. The Court quoted with approval the remarks of the Commissioner of Patents as to the difference between "Vaporub" and "Vapex," as follows: "As between "Vaporub" and "Vapex" the only similarity, either when written or spoken, is the first syllable, "Vap-"; and in view of the obvious differences it is difficult to comprehend how this one syllable in common would confuse."

Cumulative differences in marks and goods

"NEET" and "NEXT": Affiliated Products, Inc., vs. Crazy Water Co. (26, C.C.P.A.-1331; 104F [2d] 366). "Neet" used on depilatories and antiperspirants; "Next" used on shaving cream and shaving, toilet and bath soaps. Differences in marks and goods held cumulative in preventing confusion in trade, but goods held to be of the same descriptive properties. The Court said: "We have no doubt but that the involved marks, even though they may be made up of the same number of letters, and begin and end with the same letters, appear to the ocular sense in a quite different way."

"BUDGET SPECIAL" and "TETLEY'S BUDGET TEA" (Special and Tea disclaimed): Tetley and Co., vs. Bay State Fishing Co. (23, C.C.P.A.-969; 82F [2d] 299). The first is used on *fish*, variously put up; the other on *tea*. Court ruled that the goods are of the same descriptive properties but specifically different. "Taking into consideration the differences in the marks and the dissimilarity of the goods on which the respective marks are used," the Court held that concurrent use in trade of the two marks would not be likely to cause confusion.

"AEROLATOR" and "KELVINATOR": Kelvinator Corporation vs. Norge Corp. (Borge-Warner Corp. substitute) (25, C.C.P.A.-857; 94F [2d] 384). First used on air conditioning apparatus; second on refrigerators. Goods held to be of same descriptive properties, but specifically different. The suffix "-ator" is common to both marks and in the trade generally. It is not the dominating feature of either mark and the prefixes "Aerol" and "Kelvin" are quite dissimilar. The goods are comparatively expensive, "are purchased with a considerable degree of care and discrimination on the part of the purchaser . . . . They are not a matter of every-day purchase upon the part of an individual like food products or other products that require frequent replacement."

"DICAL-D" and "DIAL": Ciba Pharmaceutical Products, Inc., vs. Abbott Laboratories; Society of Chemical Industry in Basle, vs. Same. (50 U. S. P. P. Q. 139; C.C.P.A. 7-2-41.) Goods probably of same descriptive properties but entirely different in character and uses. "Dial" is used as a dormative, sedative, or hypnotic while "Dical-D" is a preparation used to meet Vitamin D, calcium and phosphorus deficiencies. One "Dial" is sold over the counter in any drug store to any purchaser, while the other is sold only on a doctor's prescription. "The fact that both are medicinal in character and have a therapeutic effect on users, of necessity makes carefulness in selection imperative."

Infringement with unfair competition

"PEPTOMINT" and "PEP-O-MINT": L. P. Larson, Jr., Co., et al., vs. Lamont, Corliss and Co.; Same vs. Mint Products Co. (265-O.G. 148, 257 Fed. Rep. 270). Appellant, Larson, registered in 1912 a trademark showing on an arbitrary design, the disclaimed words "Peptomint Gum," and re-registered the mark in 1915 with a disclaimer of the word "Mint" apart from "Pepto." In 1914 he notified the appellee, Lamont, that its use of a certain flavor-indicating mark, "Pep-O-Mint," infringed his marked "Peptomint." The evidence indicated that "Peptomint" was generally considered a corrupt spelling of "peppermint" and was so pronounced; that appellee did not imitate appellant's labels in any way nor make any attempt to palm his goods off as those of the appellant, was not guilty of unfair competition. In the Mint Products Co. case, appellant was himself guilty of unfair competition in changing his labels so as to imitate the display on appellee's labels, which through long and extensive advertising had acquired a secondary significance as indicating the origin of appellee's goods.

"CHIPSO" and "CHASE-O" (confusingly similar): The Procter and Gamble Co. vs. J. L. Prescott Co. (22, C.C.P.A.-1173; 77F [2d] 98). Appellant's (Procter and Gamble's) registration ordered canceled. Appellee established prior use and the Court held that there was a likelihood of confusion in trade at the time appellant's mark was registered and that such mark should therefore not have been registered at that time. It was not necessary that the appellee, petitioner, establish actual confusion in trade. Furthermore, it was not material in this proceeding that the appellee, after the registration of appellant's trademark, changed both the design of its carton and the composition of its product to make them more nearly like those of the appellant. All questions of appellant's right to use its mark and of unfair competition were disregarded, the only question properly before the Court being that of appellant's right to register. Said the Court: "The question of simulating the size and color of packages is a subject matter which belongs to domain of unfair competition. We are not concerned with it here."

Unfair trading

There is no unfair competition merely because plaintiff's and defendant's containers are similarly colored where they do not look much alike and defendant places its name on its containers. Taylor Instrument Co. vs. Fee and Stemwedel, Inc. (District Court of N. D. of Ill., 5-6-41).

Where an arbitrary word used as trademark for certain fruits had acquired a secondary significance as indicating origin in the plaintiff, defendant's *use* of the same word in connection with fruit juices constituted unfair competition. California Fruit Growers Exchange, et al., vs. Windsor Beverages, Ltd., et al. (48, U.S.P.Q. 608; 2-28-41—CCA-7th Circuit Court).

Where defendant adopted a label with the same blue border and red script of the wording, the only difference being in the brand names and those having the same significance, the differences were submerged in the more prominent features of the label which were copies, and defendant was guilty of unfair competition. Kraft-Phenix Cheese Corp. vs. R. E. Robertson, Inc. (25, T.M. Rep., 119; U.S.D.C., East. Dist. of Ill., 12-14-34).

Where defendant had so simulated in coloring and marking the caps, cartons and labels of the plaintiff as to mislead the purchasing public, he was guilty of unfair competition, even though he did not infringe plaintiff's trademark. Simulation amounting to unfair competition does not reside in identity of single features of dress or markings nor in indistinguishability when the articles are set side by side, but is tested by the general impression made by the offending article upon the eye of the ordinary purchaser or user. If the general impression which it makes when seen alone is such as to lead the ordinary purchaser to believe it to be the original article, there is an unlawful simulation. Chesebrough Mfg. Co., Consolidated vs. Old Gold Chemical Company, Inc. (25, T.M. Rep, 149; U.S.C.C.A., 6th Circuit Court, 4-13-34).

The facts that defendant adopted a tin-foil wrapper for its cheese and that its labels are in triangular shape does not convict it of unfair competition where the plaintiff had previously adopted a similar wrapping and similarly-shaped labels, such wrapping and shape of labels being public property. Wm. Faehndrich, Inc., vs. Wheeler Riddle Cheese Co., Inc. (19, T.M. Rep., 356; U.S.D.C., East. Dist. of N. Y., 1929).

Defendant's use of the trademark "Gold Mark" for hosiery on labels having similar colors and stripes as those upon which plaintiff displayed its trade mark "Gold Stripe," was obviously unfair competition as well as trademark infringement. Court held it was no test of infringement that the ordinary purchaser could discern dissimilarities between plaintiff's labels and symbols and those of the defendant, when they are placed side by side. The test was whether the similarity was such that it would mislead the ordinary observer or purchaser. Gotham Silk Hosiery Co. vs. Reingold (210 N. Y. Sup. 38; 16 T.M. Rep. 368).

Where no fraudulent intent was shown, it was not unfair competition for defendant to put out toilet preparations in combination gift boxes, generally much like those of the plaintiff in size, shape and color of cartons or boxes, no one feature of the box being exactly like that of plaintiff. Both were limited, by public taste, in their selection to containers of delicate coloring, the inscriptions being different but inconspicuous. The general rule is that neither use of same colors nor of same form of containers, cartons or labels constitutes unfair competition, when such features are in common use in the trade, especially when they serve purposes of utility, convenience or attraction. (U.S.D.C.-27T.M. Rep. 554—approved by C.C.A. 3rd Circuit Court, 39 U.S.P.Q. 86.)

XUM



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Military export items must stand up under severe conditions of climate, handling, storage. Photo U. S. Army Signal Corps.

Government packaging objectives

by Henry A. Wolsdorf

The packing and packaging of supplies and equipment for the United States Government—industry's largest customer—has developed along three general lines: domestic, commercial export and military.

In the past, as strength and protection requirements for shipping civilian goods domestically and in commercial export have become known to the packing industry, satisfactory practice in packaging and packing has been developed to meet them. These practices, as far as they apply to Government goods, have usually been adopted and as evolution of the packing of civilian goods proceeds, it is reasonable to expect that new developments will be applied to Government packaging.

Sufficient data have been collected to write into specifications the amount of physical protection necessary for export, and a constant check on shipping container performance is being maintained so that the contents will be delivered in usable condition. But the application of the protection frequently depends upon the ingenuity of the packaging engineer for successful solution.

The coming months will undoubtedly see an increase in Method I packaging and a greatly widened application of Method II. The performance requirements for materials used in these two methods of packaging are very high and must be maintained. As time passes and more materials are needed, this will become more difficult. Constant testing of materials is necessary.

At the same time, some of the packaging materials now in use will undoubtedly become critical. Substitutes must be obtained; continuous research must be carried on to insure their development. How rapidly the substitution of materials is necessary cannot be predicted, but it is the responsibility of the Government agencies and industry to have them ready.

The problem of military packaging and packing is essentially a problem of the Government agencies and is, to a great extent, of a temporary wartime nature. Soon after the conflict is over, the requirements that must be met in commercial shipments are the ones that will generally apply to military shipments, though military packing will continue to apply to a few items.

The term military export shipment, as used in this

article, applies to military supplies and equipment packed for overseas shipment to all theaters of operation. Included in this category are some shipments of equipment and supplies going forward under the Lend-Lease Act. Some are for the use of Allied armies, others go forward for civilian use. But, to the extent that they go in the same ships, over the same sea lanes and overland routes, are subjected to the same devastating climatic conditions and are manhandled and rehandled repeatedly, they must be protected to resist the same action as actual military supplies. Only those Lend-Lease shipments and relief shipments known to be subjected to favorable conditions of handling, transportation and storage—and not subjected to unusual climatic changes—can be packed for commercial export shipment.

Conditions the package must meet

It may be well to enumerate here some of the conditions to which military export shipments may be subjected. Frequently a shipment is completely packaged and packed by a contractor who makes delivery to a military or naval depot. After a period of storage, the shipment goes forward to a consolidation point where it is held until routed to a pier for loading on a ship. The time elapsed between packing the shipment and loading it on the ship may be brief, but it may also be several months. The amount of handling is considerable.

The route selected for the ship may, for security reasons, be considerably longer than is required in peace times for commercial export. Two to three times the normal period may be required to make the journey, and the equator may be crossed and recrossed.

On arrival overseas, the shipment may be unloaded at an established base where reasonably good mechanical handling equipment is available. Storage facilities are probably good, too, and attempts are made to cover all outdoor storage with tarpaulins as protection from the elements. Here the shipment may again be held in storage for a long period until requisitioned for use.

From this point on, the treatment of the shipment is usually more severe. The packages are given much more rough handling because of absence of mechanical handling equipment, because the handling is done by untrained, irresponsible natives. Unloading of ships must be rapid, sometimes while under enemy fire. Storage, probably mostly outdoors, may be very unfavorable, often on swampy ground since low places are selected for security reasons.

Supplies and equipment going forward with invasion troops in the establishment of bridgeheads receive by far the greatest rough handling. Unloading from ships is made into barges which go in to shore as far as possible, usually under fire. Packages are usually unloaded on the shoulders of soldiers in the best and quickest manner possible. It may be well to point out that it is not the custom to throw packages overboard and allow them to float in—many packages will not float because they are too heavy. Any packages landing in the water arrive there by accident, and are either retrieved immediately or are lost. Any wetting is by spray from the waves.

To sum up the conditions to which military export shipments may be subjected, it can be said that the packages may be handled from 50 to 70 times. Storage conditions may be most unfavorable, with little protection against the elements. The temperature may be 40 deg. below zero in one combat area. By contrast, in another area the temperature may be 140 deg. or higher, with a relative humidity of nearly 100 per cent. In such unbearable climate, metals corrode, textiles mildew and mold forms on leather overnight.

There are two very fundamental military requirements for the package:

1. The contents must be in usable condition when the package is opened.
2. The package must be of such size, shape and weight as to meet requirements of the military tactical operation.

Conditions of handling, transportation and storage of military supplies and equipment overseas are under constant study, and many improvements have been made. At the same time, reports received regularly on the condition of shipments on arrival have been the medium of improvement of packaging and packing. As the requirements for adequate packaging and packing were more fully realized, specifications were revised to meet these requirements. Reports received from abroad during the past six months indicate consistently that, wherever these specifications for military packaging and packing are followed, shipments usually arrive intact.

The trend of military packaging and packing from here on should be to adhere strictly to the specifications now in effect. This does not mean that continuous refinement of specifications ceases. On the contrary, refinement may proceed at a greater rate, since more time can be given to details that had to be ignored a year ago. Likewise, no relaxation in the requirements of adequate packaging or packing will be tolerated.

When the scene of operations changes from North Africa and Europe to the South Pacific Islands and Southeast Asia, conditions under which handling and transportation must be carried on may become more severe. The climatic conditions are definitely the severest yet encountered, and storage problems will be difficult.

It has sometimes been stated that handling, storage and climatic conditions are considerably more favorable in some areas of combat than in others, and that packaging requirements should be relaxed in the favorable areas. Such suggestions, if followed, would certainly conserve much valuable packaging material and would reduce the cost of packaging. Unfortunately, this suggestion can only be applied when the item being packaged is to be shipped into a favorable zone. In other instances, for tactical reasons especially, and also for uniformity in procurement, production, stockpiling, flexibility of distribution, and because the packer seldom knows the final destination, military equipment and supplies should be packaged for military export shipping. This is just another demonstration that war is wasteful and expensive.

Inner containers

by F. S. Leinbach

In 1943 America caught the rhythm of the war. Armies moved with increasing offensive momentum all over the world, knowing what materials they had, what materials they could expect to get, what to do with them, and what they wanted to accomplish. Industrial supply fell into the pattern spearhead by the strategy of the Army and the Navy. The wild scramble for materials that characterized 1942 settled into a flow pattern of remarkably well-known volumes and direction. As the year progressed, industry, like the military, knew what materials it had, what it could expect, what was to be done with them and how to do it. With the notable exception of paper—the last material to reach anything even approaching a state of dynamic equilibrium—almost all war materials had their jobs laid out for them.

The year 1942 found those responsible for military packaging engaged in a mad rush to stem an increasing flood of complaints and reports of failure from overseas. They specified packages designed according to the best combined judgment that could be assembled, although there was then a pitiful lack of real basic information as to the requirements that had to be met. Package material suppliers were engaged in an equally mad rush of development trying to produce materials that would meet whatever outline of requirements they had.

During 1943, however, with increasing information from overseas, with the return of combat men to give their first-hand reports, with the development of packaging materials and techniques in wonderful measure, and with the accumulation of data from considerable intensive test work by many laboratories and agencies, the picture began to sift down to a fairly well-established set of standards against which, as in other fields of industry, it became known what materials were available, what could be done and how it should be done.

Thus, as 1944 military packaging continues, it does so on an even keel, its requirements fairly well outlined, its available materials fairly well known, its techniques fairly well standardized, and its results fairly well proved in the fire of combat.

As is well known, the term "packaging," in the parlance of military specifications, refers to the primary container of a product rather than to its shipping container. The latter is referred to as its "packing." Thus, the can that holds the tomatoes is the package, the box that carries the can is the packing. In some instances the primary container serves also as a shipping container, and the differentiation does not apply so clearly.

The materials used in military packaging cover a range just as broad as that covered by the entire field of packaging for any purpose. In general, however, these materials must be of superior strength and protective quality, simply because the delivery job they must do is much, much harder than in the case of the ordinary packaging job. Tinplate is used where blackplate might otherwise be considered. Glass is used where a less resistant container might be possible domestically. High kraft-content papers and boards are required where lesser boards would otherwise be in order. Specially constructed laminations made with extra strength and built to have lower water-vapor permeabilities, better waterproofness, better wet strength, better resistance to sub-normal or excessively high temperatures, or better ability to maintain their strength under excessively dry or excessively humid conditions, are required.

The personnel working on packaging has expanded greatly—an encouraging indication of governmental realization of the importance of packaging in the war effort. The point of issue of specifications has become fairly well established, and there is considerable cooperation among the various agencies for a standardization of specifications.

Any attempt to list in detail the various commodities along with their container specifications, and the point of issue of those specifications, would not only be beyond the scope of this article, but would be virtually impossible. Within the Army, the Medical Corps alone has a catalog which lists about 8,000 items. The Ordnance Department has many thousands of items, each with a multiplicity of individual parts. These, of course, do not all carry individual types of packaging, but can be classified even though such classification is necessarily complex. Much the same situation exists within the Quartermaster Corps and the various other technical branches of Army Service Forces. The Air Corps presents a similar picture, the Navy has an equally complex problems through all of its items, and the War Food Administration purchases and ships hundreds of separate food and feed agricultural and prepared products, which, again, although they can be classified as to their containers, present a highly complex picture. The purchases of the Procurement Division of the Treasury Department are as varied as American products.

The entire picture might best be presented from the point of view of the various agencies and the parts of the organization from which the specifications issue.

Army Service Forces

Quartermaster Corps—Responsibility for packaging specifications for the Quartermaster Corps lies, to a large extent, in the Packaging and Subsistence Section, Research & Development Branch, Military Planning Division, Office of the Quartermaster General, Washington, D. C., and the Quartermaster Corps' Subsistence Research Laboratory, Packaging Section, Chicago Quartermaster Depot, Chicago, Ill.

The packaging problem handled at these two places can be divided into two general groups:

1. Packaging for combat rations—
   (a) Packages for Army Ground Forces.
   (b) Packages for the Army Air Force.
2. Packaging for general subsistence items.

The Quartermaster Corps advises that the packaging of rations and general food items differs somewhat in their purpose. This is best illustrated by a brief summary of their uses, outlined by the Chicago Quartermaster Laboratory:

Army Ground Force combat rations are of four main types:

The K Ration—This is used by men who are in the thick of the fight. It is almost always eaten over a period of a few hours, whenever there is a quiet moment, and the soldier can divert his attention from firing his gun. It is rarely eaten warm. Since the K Ration is used in this manner, it, of necessity, must be light, compact, and the food individually wrapped, so that the unconsumed portion may be carried in the soldier's pocket until he has a chance to finish his meal. There are separate packages for each meal in the day, thus limiting the amount of food exposed to the elements.

The ration package, both in and out of its case, which holds 12 rations, probably receives rougher treatment than any other food package used by the Army Ground Force. It is composed of a waxed carton in which are placed a can of meat or its equivalent, cigarettes, matches, toilet paper, chewing gum and a laminated cellophane bag containing biscuits, sugar, a beverage and either candy or fruit. The waxed carton is placed in another carton, made mainly of chipboard This is done to cover the wax, and to protect the waxed coating from the rough handling it receives. Twelve rations consisting of breakfast, dinner and supper units, or 36 cartons in all, are placed in a V-3 case and over-packed in wood. This pack, the result of innumerable tests, has proved very satisfactory.

The C Ration—This consists of two cans per meal, one containing meat, the other biscuits, candy, a beverage and in some cases cigarettes. Six cans a day make a ration. It is used in the majority of cases just behind the fighting lines where it is possible to build a small fire and heat the meat unit and the beverage. Eight rations, or 48 cans, are packed in a wooden case.

The New 10-1 Ration—In its preliminary trial this has given excellent results. The 10-1 Ration feeds ten men for one day, but is so constructed that it can feed five men for two days without exposing the second day's food to the elements before the second day arrives. The ration includes two waxed boxes in which are placed identical, flexibly packaged components, and two solid fibre boxes containing identical can components. A corrugated carton is placed over each waxed box. Two waxed boxes and two boxes containing cartons are placed in a V-1 or V-2 solid fibre case complete. One waxed box and one box of cans hold all the components necessary for food required by five men for one day. With the additional waxed box and can box there is enough food for ten men for one day. Like the other rations, this one is carried into the forward areas on the soldier's back, which means that it must be small and compact, and under 50 lbs. in weight. It is used by tank crews, small outposts, and in forward areas in messes where it has not been possible to send the B Ration used in the rear areas.

The D Ration—This consists of a chocolate bar in a cellophane bag or a greaseproof paper wrapper placed in a wax-dipped carton when packed as an individual ration. This ration is now used mainly to supplement the other three.

Packages for Army Air Forces: Air Force Emergency Rations—These are used only when pilots bail out of their planes. This fact brings in an element which is not encouraged in packaging for ground force troops. The emergency type packages for the Air Force must be limited to metal cans because it is not possible to build a flexible package which will hold the pressure produced inside the package when the plane is at a high altitude. It is very important that the emergency package should not permit breathing, since a pilot may have an emergency ration on his person for two or three months before he bails out. In the case of a man stationed in the tropics where the atmosphere generally is very moist, each time he flies to an altitude of 20,000 to 35,000 ft., a portion of the air inside of a flexible pack would escape. Upon his return to earth, air heavily laden with moisture would seep into the package, and the moisture in that air would be gradually assimilated by the food. During the pilot's next flight, a further portion of the air in the package is again exhausted. This sequence of exhausting the air and inserting moisture-laden air has the net effect of pumping moisture into the food products. This means that if a pilot had to bail out after carrying the same emergency package for two or three months, he would open his package only to find the food spoiled.

Air Force Flight Rations—The breathing possibility in flexible packages is not of any concern for food packages used by the Air Force while in flight, for although the air may escape, the food is consumed shortly after it leaves the ground. Therefore, for this type of ration any package which satisfies the ground forces structurally and protectively will also be satisfactory to the Air Force.

Packaging for General Subsistence Items—The bulk of the food used in the army is of the variety which is bought in stores. When packaging these items, the main points to be considered are:

1. Individual packages which contain quantities of foods suitable for issue to company kitchens.
2. Individual packages which supply sufficient water-vapor protection as well as sufficient structural strength.
3. Allowable markings should be large and clear.

In designing packages for general food items to be used by the Army, the Quartermaster Corps tries to use the institutional packages now on the market. The reason for this lies in the lack of new machinery and of critical materials for manufacturing specialized individual packages. Since, however, many individual packages do not provide the necessary water-vapor protection for overseas shipment, the final pack is so designed that four or six packages, depending upon the weights and sizes of the individual units, are placed in a domestic corrugated case, and the domestic case is inserted in a water-vaporproof bag, such as the cellophane foil kraft bag or a creped kraft asphalt laminated bag, and this assembly then is placed in a V-board case or in wood. In this way, the food receives the maximum protection until the case is opened. Assuming that once the case is opened the food will be consumed in a short time, it is felt that the present institutional packages in most cases have been satisfactory.

It might, therefore, be said that there are two general plans of attack when packaging a new general supply food for the Army.

1. If the individual packages provide extreme water-vapor protection themselves, the main point to be considered is to give the packages and the case sufficient physical protection to withstand the abuse the goods will receive in transit.
2. If the individual packages do not provide sufficient water-vapor protection, four or six packages are usually inserted in a large water-vapor protective bag. In this way, the best moisture protection will be given at the lowest cost without a large outlay for packaging machinery.

The Containers Section, Technical and Planning Branch, Fuels and Lubricants Division, Office of the Quartermaster General, is responsible for containers pertaining to petroleum products. Obviously, these draw mainly upon metal, and must continue to do so. Extended experiment has been conducted in an effort to develop non-metallic containers prior to the current critical situation surrounding paper, but none of these had ever developed to the point where it was felt safe to use them to any great extent in overseas shipments.

Surgeon General's Office—Medical Corps' specifications issue from the Army Medical Purchasing Office, New York City. Coincidental with their issue, of course, approval or concurrence by the Specifications and Inspection Branch, Procurement Division, Surgeon Gen-



1. In packaging axle assemblies for war, paper is used as a protective inner wrap. Photo General Motors Corp.

eral's Office, Washington, D. C., and the Packaging Section, Storage Branch, Distribution Division, Office of the Surgeon General, Washington, D. C., is required.

The many items of the Medical Corps are classified into nine groups:

Class 1 includes bottles, fibre cans, metal cans, tubes, vials and ampoules; in other words, the drugs, chemicals, pharmaceuticals and biologicals. Obviously, these packages are packed further to prevent breakage, water damage, etc. Closure is highly important and reclosure is an equally important feature.

Class 2 items comprise absorbent cotton, surgical dressings, adhesive plaster and the like. Most of these are put up in the usual types of cartons and the usual wrappers.

Class 3 items are the surgical instruments and surgical supplies. They usually come in a protective paper, such as greaseproof, then in the usual type of carton. A special bag liner is seldom required since the original pack of instruments is virtually always broken down at the depots, with only a few issued at any one time.

Class 4 items are laboratory equipment and supplies.

Class 5 items are the dental equipment and supplies. Among these are smaller items such as syringes, spatulas, filter papers, etc., which may be purchased in individual cartons.

Class 6 items are concerned with X-ray equipment. A notable packaging job here is the waterproof foil lamination in which the film is placed. The larger equipment, of course, places more emphasis on packing than on packaging.

Class 7 items comprise furniture, physiotherapy equipment, hospital linen and bedding, mess equipment and supplies, cleaning and preserving equipment and supplies, office equipment and supplies, etc.

Class 8 covers veterinary supplies.

Class 9 comprises field items, and it is among these that the most careful packaging must be done. Many of the items are carried by the individual soldiers. All must meet field conditions. Supplies must be in unquestionably perfect condition at the time they are used. There are eye-dressing sets and burn-injury sets, tablets placed in foil laminations, jungle kits, parachutists' kits, Arctic kits, dental kits, medical kits, etc. Most field items are carried by the soldier, and they must be packaged against water and water vapor. They must be quickly accessible, must be of such size and shape that they will not interfere with his movements. Visibility is sometimes important to show the first-aid items available, and in many cases the items must also be packaged against deterioration. Block tin is allowed for syrettes. In the case of dried blood plasma, a vacuum pack must be used. Even the rubber tubing which goes along with each unit is placed in a can in an atmosphere of nitrogen. In the packaging of non-field medical items, dispensability is a feature, as is packaging against deteriorations. As a general rule, the bottle meets both requirements. It can be opened and closed, reopened and reclosed with minimum deterioration of contents. Closures, as always, must be carefully chosen according to the contents, and no single closure will do all jobs.

Ordnance Department—Some of the most interesting techniques brought out by the war, involved corrosion prevention.* As is generally known, this is developed along three lines. The first is the well-known Method I. It is used on spare parts, generally those which are sent to established bases, and which by their nature will not be harmed by heavy, more or less hard, corrosion-resistant coating materials. The finished parts are thoroughly coated with one of the various wax-like, corrosion-resistant compounds available, and then covered with a wrapping that is carefully made to be chemically neutral. The second method, the well-known Method II, is used for packaging machine parts or assemblies which, by their nature, will be harmed by the compounds necessary under Method I. It is also employed to package parts intended for speedy use at their ultimate destinations. For use on parts which may be stored in great number and where it would be virtually impossible to re-inspect to learn the condition of the contents, there has been developed Method I-A, really an improved form of Method I. These packages protect the part for a long period against the corrosive effects of moisture, and further protect against the entrance of water. "Sealable," "moldable" films, papers and tex-

* For a full description of these methods see "War Packaging of Metal Parts," p. 99.

tiles—and laminants of various of the three—have been the packaging material, followed by wax dipping of the entire wrapped part.

Aside from the above techniques of corrosion-preventive packaging, the main interests of the Ordnance Department in packaging are to secure sufficient strength of package and in many cases sufficient waterproofness so that the individual components, in proper number for issue, arrive in the proper condition for use.

Corps of Engineers—The Engineer Field Maintenance Office, Columbus, O., is charged with responsibility for issuance of all technical instructions concerning processing and packaging of Corps of Engineers' mechanical equipment and spare parts. The Engineer Field Depot Office, Columbus, O., is responsible for the issuance of all technical instructions concerning the processing and packing of all non-mechanical items of Corps of Engineers' equipment and supplies, or any items not specifically assigned to the above-mentioned office. In general, it may be said that the problems of the Corps of Engineers are very similar to those of the Ordnance Department. The techniques and the materials that are used are equally similar, and were developed in conjunction with the Ordnance Department.

Signal Corps—As might easily be imagined from the nature of Signal Corps equipment, the complexity of their assemblies, etc., this group utilizes to a high degree the water-vaporproof barriers and dehydrating agents outlined as Method II, above, and used by the Ordnance Department and the Corps of Engineers.

Transportation Corps—Responsibility for specifications, particularly those that apply to markings, etc., that are issued by the Transportation Corps' center in the Packing and Packaging Sections, Water Division, Office of the Chief of Transportation, Washington, D. C.

All of the above references have applied to the technical branches of the Army Service Forces.

Army Air Forces

There is considerable parallel between the work of Army Air Forces and other branches of the Army, as already has been seen in the above discussion presented by the Quartermaster Corps concerning the packaging of rations for air combat units. In the handling of mechanical parts, the pattern used by Army Air Forces closely parallels that used by Ordnance, Engineers and the Signal Corps. Indeed, so much of the developmental work of these methods was done by Naval and Army Air Forces that it may be said these groups took the lead in bringing about their initial definition and use.

United States Navy

Equal detail might easily be given the excellent specification work done in packaging by the Navy. It would, however, closely parallel in many ways the above discussion on the work of the Army. Indeed, much effort has been used by both agencies to keep their work parallel, both because of unified procurements in some items and because of the fact that in many cases the package must do the same job for either part of the armed forces. While there are many instances where the Navy must give great attention to packaging for combat conditions (such as for the Marine Corps), and while special items (such as Abandon Ship and other emergency rations) must be packaged with considerable thought given to the problem of corrosion by sea air and salt water, it also is true that some items (such as those used in standard manner on large ships) can use a more nearly standard package.

Because of its proximity to the transport problem, the Navy has made a valuable contribution in outlining the problem required of packaging for military use. Naval specifications, though they may issue from various yards or depots, are centralized in the Container Section, Office of Procurement and Material, U. S. Navy, Navy Building, Washington, D. C., and Container Section, Bureau of Supplies and Accounts, U. S. Navy, Washington, D. C.

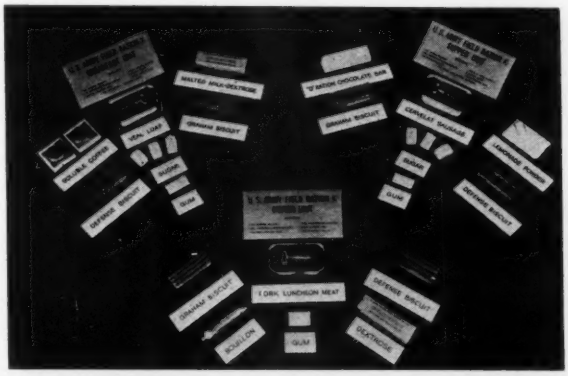
War Food Administration

Container specifications for this agency are largely centralized in the Containers and Packaging Branch, Office of Materials and Facilities, War Food Administration, Washington, D. C.

For these men the problem is ever changing because

2. Protection of Army rations demands many types of packaging materials and techniques. Photo U. S. Army Signal Corps. 3. Compact box holds 24 units of medical supplies, enough for first aid to all but the severest casualties.

2



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this, of course, is the agency which will be called upon to package the Lend-Lease foods that so many people expect will be sent to feed the liberated peoples of the various countries of the world. The materials they use must necessarily cover the whole range of materials available for food containers. The requirements placed upon the packages they specify may in many cases be less stringent than those placed upon other military packages, yet it must be remembered that many items originally sent Lend-Lease are transshipped to military forces—including our own—in overseas areas after they have been received by the country in question. Therefore, the men handling Lend-Lease foods have found it necessary to follow pretty much the same pattern as outlined above for the Quartermaster Corps' handling of foods, although it has been possible for them to relax these standards somewhat in certain of the items where the destination has been known, and the route less vigorous.

Published specifications

It should be pointed out that considerable reference is made by all agencies to U. S. Army Specification No 100-14A which is identical with U. S. Navy Specifications 39P16-a. This specification is used by the Army, the Navy, Department of Agriculture, the Treasury Department and other agencies as it becomes necessary for them to make container specifications, since it is the parent and the keystone of currently used military container-specification manuals.

The Quartermaster Corps has issued for its own use a General Supplies Manual known as GS-1. They are also issuing a manual on the packaging and the packing of subsistence supplies, known as Sub-1. The Ordnance Department has issued various manuals on corrosion prevention and packaging for corrosion prevention, and the Corps of Engineers has issued their tentative manuals TM5-9711 and TM5-9713 which outline the packaging methods required. The Medical Corps has not issued a manual, but has worked out quite a clear-cut picture of its requirements.

It would be impossible ever to review or to discuss military packaging without again pointing out the fact that what has been done has been accomplished with an absolute minimum of critical materials. In fact, there are many well-known instances where the armed forces have kept working to try to use non-critical materials even after some civilian uses had given up. It should never be forgotten that the *only* form of conservation that exists in military packaging lies in delivery of commodities in usable condition with the most efficient possible use of whatever materials—critical or otherwise—are needed to make that delivery. To this end, as the broad pattern of military packaging becomes clear, and stable in a dynamic sense at least, we should all realize, and give to those who have been responsible, the tremendous credit which is their due for the job that they have done.

It would be impossible to give full acknowledgment for the help that many of them have given in the preparation of this article—which actually is not more than a compilation of the data these men have presented for use.

Bureaus which Issue Packaging and Packing Specifications

Army Service Forces

QUARTERMASTER CORPS

Packaging and Subsistence Section, Research & Development Branch, Military Planning Division, Office of the Quartermaster General, Washington, D. C.

Quartermaster Corps' Subsistence Research Laboratory, Packaging Section, Chicago Quartermaster Depot, 1819 W. Pershing Road, Chicago, Ill.

For Petroleum Products: Containers Division, Technical and Planning Branch, Fuels and Lubricants Division, Office of the Quartermaster General, Washington, D. C.

SURGEON GENERAL'S OFFICE

Army Medical Purchasing Office, 52 Broadway, New York City.

Medical Dept., Supply Service, Room 603, Maritime Bldg., Washington, D. C.

ORDNANCE DEPARTMENT

Packaging Section, Production Service Branch, Industrial Division, Office of the Chief of Ordnance, Washington, D. C.

Packaging Unit, Production Engineering Section, Ammunition Branch, Industrial Division, Office of the Chief of Ordnance, Washington, D. C.

Packaging Unit, Small Arms Branch, Industrial Division, Office of the Chief of Ordnance, Washington, D. C.

Packaging Unit, Artillery Branch, Industrial Division, Office of the Chief of Ordnance, Washington, D. C.

Packaging Unit, Small Arms Ammunition Sub-Office, Philadelphia, Pa.

CORPS OF ENGINEERS

Mechanical Equipment: Engineer Field Maintenance Office, Requirements Storage & Issue Branch, Supply Division, Office of the Chief of Engineers, Columbus, O.

Non-mechanical Equipment: Engineer Field Depot Office, Columbus, O.

Inspection Section, Procurement Division, Room 2103, Temporary F Bldg., Washington, D. C.

SIGNAL CORPS

Packing and Packaging Section, Office of the Chief Signal Officer, Washington, D. C.

Chemical Warfare Service, Technical Division, Room 2339, Temporary "T-7" Bldg., Gravelly Point, Va.

TRANSPORTATION CORPS

Transportation Corps, Packing and Packaging Sections, Office of the Chief of Transportation, Washington, D. C

Army Air Forces

Office of the Command General, Material Center, Wright Field, Dayton, O.

Navy

Container Section, Office of Procurement and Material, U. S. Navy, Navy Building, Washington, D. C.

Container Section, Bureau of Supplies and Accounts, U. S. Navy, Washington, D. C.

Marine Corps

Packing Section, Dept. of Supplies, U. S. Marine Corps, Philadelphia, Pa.

Lend-Lease

Room 819, Lend-Lease Bldg., 515—22nd St., N. W., Washington, D. C.

Department of Agriculture

Containers Section, Dept. of Agriculture, Administration Bldg., Washington, D. C.

Treasury Department

Inspection Division, Procurement Division, Treasury Department, Washington, D. C.

War Food Administration

Containers and Packaging Branch, Office of Materials and Facilities, War Food Administration, Washington, D. C.

Outer containers

by George T. Henderson

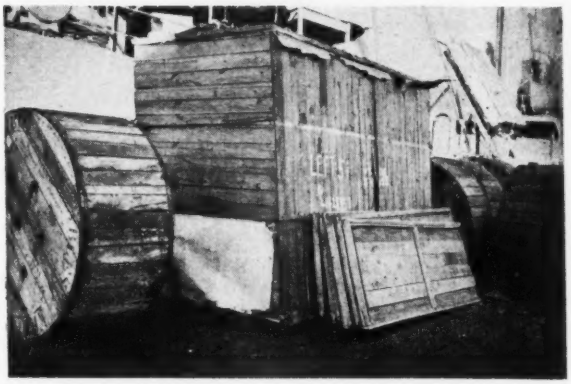
During the first year of our active participation in the war, there was a good deal of confusion and uncertainty as to what type of packing to use in the shipment of Government orders. Now in 1944, however, with practically every service and war agency having its own packing section, and with the publication of various packing manuals and general container specifications, there is hardly an order placed by any branch of the Government which does not carry specifications covering packing.

To be sure, the packing instruction clauses on Government contracts may not always be in detail, but nevertheless they will contain a clear indication, at least, of what latitude is allowed the supplier. The purchase contracts will ordinarily indicate the type of packing required, and state the name and number of the specification which must be complied with. This may be in terms of a specification covering several types of allowable outer containers—such as U. S. Army 100-14A or U. S. Navy 39P16a—or it may be in terms of such a specification as the well-known OQMG Specification No. 93 on fibre boxes.

For many items to be used domestically, and usually wherever it is practicable to do so, the packing requirements simply indicate "commercial containers." This is done mainly to allow the supplier to use his customary method of packing, although often this flexibility proves to be of great convenience when shortages of certain types of containers exist. When such packing requirements ("commercial containers") are given, it is understood to mean that the packing to be supplied is such as would be used in ordinary domestic commerce and be acceptable to common carriers. Methods of packing meeting the requirements of the current issue of the Consolidated Freight Classification may generally be safely regarded as coming under "commercial containers."

When the packing instructions call for a specific type of container and give the specification number—whether it be for wooden boxes, wirebound boxes, plywood boxes, fibre boxes or whatever—it is important, unless specific permission to the contrary in writing has been obtained, that the contractor meet that specification, and meet it in every respect. But it should be noted that many of the prewar Government specifications on domestic shipping containers are still in use by most of the Government agencies, and a number of these contain special requirements not found in standard commercial containers. There have been cases where these specifications were hurriedly read and thought merely to indicate the usual type of domestic box. When the goods were ready, the Government inspectors rejected the shipments as being improperly packed—and very costly delays resulted. It must be remembered that inspectors are ordinarily without authority to do other than reject goods not in accordance with specifications, and therefore it is advisable to

1



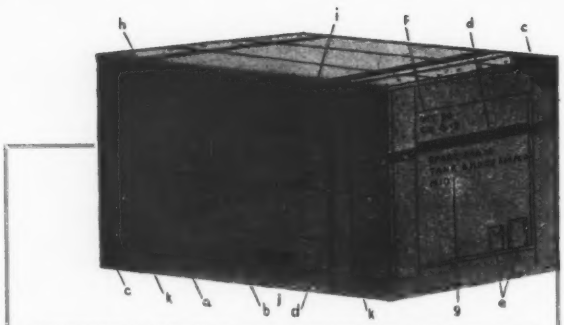
2



3



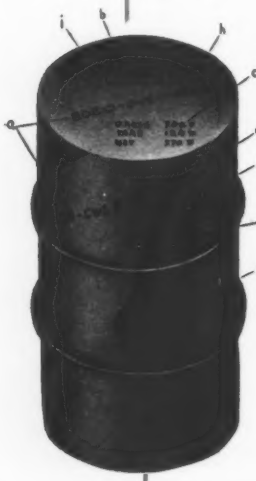
1. Contrary to specifications, waterproof paper was put on outside of crates. Most of it tore off during handling. 2. These war-material steel containers have corroded. Improved exterior coatings are needed. 3. V-2 boxes meet specifications, reach their destinations in excellent condition; other boxes were badly torn. Photos U. S. Navy.



CORRECT MARKING OF CONTAINER SHIPPED FOR DELIVERY OVERSEAS

(a) Overseas address; (b) priority marking, when indicated; (c) CWS service color marking (chemical blue); (d) service color marking, 2" band around smallest perimeter of container and 2" stripe across each end; (e) 2 packing lists in waterproof envelopes, 1 protected by cover plate; (f) weight and cubage; (g) brief description of contents; (h) domestic shipping label; (i) package number; (j) CWS insignia; (k) strapping.

a, b, f, g, h, i, j must be stenciled on container.



MINIMUM MARKING REQUIREMENTS FOR DRUMS

(a) Overseas address (top and side); (b) domestic shipping label; (c) gross weight; (d) cubage; (e) contract data; (f) ICC placard; (g) CWS insignia; (h) CWS service color marking (chemical blue) to be placed near overseas address; (i) name of product.

No domestic shipping label required when shipped in carload lots.

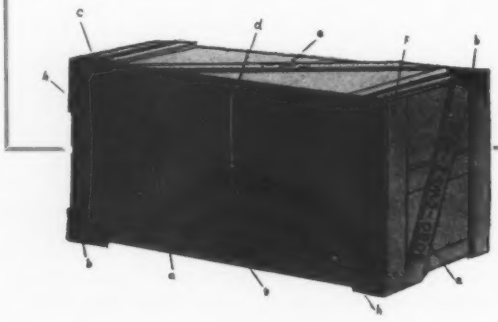
a, c, d, g, i must be stenciled on drum.

CORRECT MARKING OF CRATE CONTAINERS SHIPPED AS PART OF LCL OR LTL SHIPMENT WHEN IDENTICAL ITEMS ARE CRATED

(a) Overseas address (2 surfaces); (b) CWS service color marking (chemical blue); (c) weight and cubage; (d) brief description of contents; (e) domestic shipping label; (f) package number; (g) CWS insignia; (h) strapping.

No packing list required when identical items are crated.

a, c, d, f, g must be stenciled on crate.



be sure of one's containers. The leading container manufacturers are familiar with these specifications. When they are consulted, they are able to avoid such pitfalls.

The waterproofing of export containers presents a number of interesting problems to the shipper. Except for drums, some types of barrels and certain other containers, practically all overseas shipping containers are required to have inner linings of a waterproof material. Depending upon the kind of box, crate, bag or other variety of exterior container, different types of linings are used. Most convenient, and usually very effective, are the liners that come in the form of a bag. These generally are of a design which permits the closure to be made simply.

The Government packing specifications usually refer to a listing of the grades of material that may be used in making waterproof linings. Packers should be sure that the size of the liner is on the generous side, so that it is subjected to no severe stresses in shipment.

Many items, made wholly or in part of metal, require protection against corrosion. Before the war, most shippers felt that making shipping containers watertight would be adequate to prevent corrosion. The experience of the early months of the war quickly taught how wrong this is, how necessary corrosion-preventive measures are.

While today there is quite general agreement among competent authorities as to which items require corrosion-preventive treatment and which do not, there are many divergent views with regard to the best method for individual items. In such a new field, replete with endless complications, and covering items ranging from screw drivers to ball bearings and airplane engines, such differences of opinion are only to be expected. For many months there have been attempts to achieve standardization of technique and materials, but much remains to be done. Until the issuance of broad general manuals, the shipper must be sure to follow closely the specifications of the procuring agency, and when in doubt never to risk the possibility of corrosion.

The methods of sealing and strapping boxes are now almost always given in the Government purchase orders, so that there is seldom any serious confusion or misunderstanding in this connection. In the past few years, a number of new adhesive and strapping-material specifications have been prepared, and their performance requirements are such that most of the ordinary grades are ruled out. This is almost invariably the case wherever adhesives are concerned.

The marking of shipping containers is usually regarded as a simple detail. This common impression, however, is apt to be dispelled by the perusal of one agency's "Specifications for Marking of Outside Shipping Containers by Contractors." This specification requires nine mimeographed pages adequately to do its job.

The importance of the proper marking of export shipments, and particularly of military supplies, is rarely understood even by most competent packing men. The war agencies, and particularly the armed forces, have exceptionally fine systems of marking and identification, and even after the war large shippers will find their study worth while.

War packaging of metal parts

by W. T. Black

When we entered the war in 1941, there was only one widely accepted method of corrosion prevention on metal parts and assemblies. This method, which was later to be known as Method I, incorporated the use of dipping compounds and greaseproof wrappers.

Soon after this, however, Army Ordnance, gaining experience on proper methods of packaging metal parts and assemblies, approved the use of Method I-A, now widely used by most of the branches as an improved means of preventing corrosion. But long before Pearl Harbor, industry experimented with a new method of corrosion prevention which was found to be highly satisfactory—Method II. It was first accepted and used by the Army and Navy Air Corps which were soon followed by the rest of the branches.

Method I

This method, which incorporated practices used during World War I (dip and wrap), was the only method the services had to turn to when we started exporting and storing war matériel. They were soon to learn, however, that this method, even on semi-critical metal surfaces, was not satisfactory, and they clearly saw the need for many improvements. Such improvements have now been made, and through the use of newly developed pH-controlled greaseproof materials, rust-inhibiting dipping compounds, and certain corrosion-prevention practices in the packaging operations, Method I takes its place as an acceptable means of packaging many kinds of metal parts and other items—machined, forged or cast.

The success of a Method I application depends upon:

1. Part or assembly must be properly cleaned and preserved.
2. Part or assembly must be wrapped in greaseproof wrapper, bag or carton which is non-corrosive.

According to a packaging and packing manual issued by Army Ordnance:

> The function of the greaseproof, non-corrosive wrapper is to prevent the flow of the preservative from the surfaces of the packaged material, to prevent contact of parts' surfaces with dunnage or blocking, and also to provide some protection against mechanical damage from impact, abrasion, and the like. Corrosion resistance in a Method I package is provided entirely by the applied preservative. This preservative must be adequate to resist the action of corrosive atmospheres, moisture vapor, and possibly liquid water. To function properly, the preservative must not flow off during hot weather, must not be absorbed by blocking and dunnage, and must not be scraped and squeezed away. Contact with blocking or dunnage is undesirable because these materials contain corrosive agents to varying extents. From a corrosion standpoint, the wrapper itself will contribute little or no protection. The lack of sealing permits entry of corrosive agents even if the material itself is relatively impervious to

Methods of Preparation and Packaging of Various Parts and Assemblies

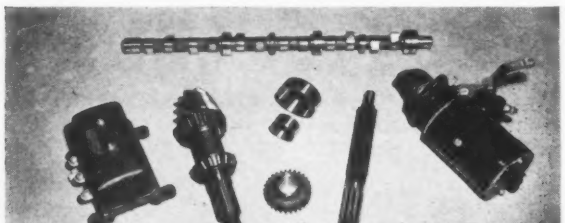
Part or Assembly	*Cleaning*	*Rust preservative*	*Greaseproof wrapping*	*Moisture-vapor barrier*	*Silica gel*	*Water repellent barrier*	*Additional instructions*
			Method I				
Flywheels	Yes, any applicable method	AXS-673	Yes, Grade A material	No	No	Only as case liner for multiple pack	None
Mufflers	Yes, before assembly	AXS-673 on exterior if not painted, fog interior with AXS-673 or 674	Yes, Grade B material	No	No	Only as a case liner for a multiple pack	None
			Method I-A				
Clutch pressure plate and cover assemblies	Yes, before assembly	AXS-673	Yes, eliminate all possible voids	No	No	Yes, eliminate all possible voids, waterproof individually	AXS-673 should not be used on facings
Oil pan assemblies	Yes, before assembly	AXS-674	Yes, eliminate all possible voids	No	No	Yes, eliminate all possible voids, waterproof individually	None
			Method II				
Fire control parts and assemblies	Yes, with extreme care on choice of method used on such delicate parts	Yes, rust inhibiting lubricants and certain compounds	No, only in special cases	Yes	Yes	Yes, must be waterproof as well as moistureproof	None
Turret traversing drive mechanism with electric motors	No	None	None	Yes	Yes	Yes, must be waterproof as well as moistureproof	None

these agents. On the other hand, the lack of sealing permits easy exit of any condensed vapors or water admitted.

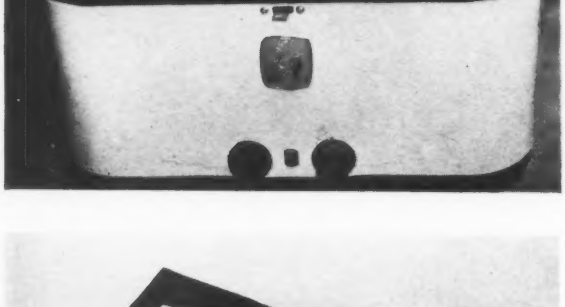
Method I-A

With the coming of improved greaseproof wrappers and dipping compounds, there appeared to be a category of metal parts and assemblies—bearings, filters, gears, etc.—which required longer and more positive protection against corrosion. Accordingly, Army Ordnance, after extensive research, approved the practices of Method I-A, introducing a method whose success depends upon:

1. Parts to be wrapped by Method I and I-A. 2. After wrapping in greaseproof paper of controlled acidity, the part is dipped in molten wax. Photos Dearborn Chemical Co. 3. One type of greaseproof paper approved by Ordnance for wrapping small metal parts is creped for moldability, is highly resistant to tearing, is self-adhesive.


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1. The part or assembly must be properly cleaned and preserved. Preservative must offer adequate protection against moisture condensation from entrapped air volumes and against the moisture which might be transmitted through the barrier.
2. The part or assembly must be enclosed in a waterproof packaging medium. Either the wrapper alone, or the wrapper plus subsequent operations, shall render the package waterproof but not necessarily moistureproof.

Most of the service branches concerned with packaging metal parts or assemblies have written specifications stating to what degree the I-A pack must protect the part. Army Ordnance, for example, specifies that all I-A packs must be capable of passing a cycle-exposure test outlined in detail in one of their manuals which specifies that the function of Method I-A is to provide long-term protection against corrosion caused by moisture or corrosive atmosphere. The entry of fresh or salt water from rain, wave slushing or possible immersion is resisted by the waterproof, sealed barrier.

Waterproof characteristics of the wrapping may offer resistance to liquid water only, and not moisture vapor. States an Ordnance manual:

> Many "waterproof" materials permit measurable transmission of moisture vapor. To resist corrosion by this transmitted moisture vapor and also by moisture condensed from included air volumes is the function of the applied preservative. If the parts are made of corrosion-resisting alloys or are plated or painted, the applied preservative may be light or it may be left out. This, however, should be done only when it is definitely known that the painting or plating offers protection to all surfaces and that this protection is equivalent to that obtained from satisfactory preservatives. In any case, the combined wrap and seal must present a continuous waterproof surface. Small breaks, holes or cuts will greatly reduce the effective lift of a package or even cause excessive corrosion by retaining admitted water or other corrosive agents. . . . As in Method I packaging, the wrapper immediately next to the part should retain preservatives on parts' surfaces and be non-corrosive. This may require an extra underwrap if the waterproof wrapper is not also greaseproof and non-corrosive.

In either case, the wrap should conform to the part or assembly so as to exclude as much void space as possible and thus reduce the amount of enclosed air volumes containing moisture and contaminated atmospheres.

Method II

Some time before we entered the present conflict, there was considerable experimentation in packing complicated and delicate parts and assemblies by means other than dipping in a compound and subsequently wrapping in greaseproof material (Method I). Engineers in studying the corrosion problem on metals found that if moist, contaminated atmospheres could be excluded from the part or assembly, corrosion would not occur. They reasoned that if a moistureproof barrier could be made to enclose the part to be protected, and if the trapped air volume inside the barrier could be decontaminated and dehydrated by some means, the danger

of the part or assembly corroding would be eliminated if the design of the package was proper and the materials used were designed to do a good functional job. After considerable experimentation, it was found that pliofilm offered adequate protection against moisture-vapor penetration. When it was used along with silica gel packed in cloth bags, the resultant package was a definite improvement in the practice of corrosion prevention over anything previously tried. Pliofilm could be heat sealed to form a relatively airtight, transparent barrier, and silica gel decontaminated and dehydrated the trapped air volume inside the barrier. When the desiccant adsorbs its limited capacity of moisture, it must be recharged. An ingenious color indicator enclosed in the package is used as a signal: when the upper limit of safe humidity is reached, the indicator changes color. Therefore the transparency of the pliofilm, which permits a view of this indicator, is important.

Silica gel, being chemically inert and of cellular construction, was found to adsorb contaminated atmospheres and moisture vapor by physical means only. This eliminated any possibility of a chemical reaction inside the barrier which might be harmful to the part.

The first conclusive tests incorporating this new method were conducted on aircraft engines with industry's coöperation, and it was shown to be a safe, improved method of preserving complicated assemblies. It was found, too, that many hours could be saved, especially in the field of operation, if Method II were used. This was possible since, instead of heavy dipping preservatives which had to be removed before the assembly could be used, only light-working preservatives—and in some cases no preservatives at all—were necessary. Thus the equipment was readily rendered available for immediate use or further assembly. This advantage was quickly recognized by the branches.

The aircraft industry, however, used Method II as a standard practice on their engines and carburetors many months before our participation in the war. Therefore it was natural for the Army and Navy Air Corps to designate this method when they wrote a specification covering the packing of these two items. The Air Corps specifications were followed by a manual which the Army Ordnance issued, describing Method II as an approved means of packaging some of their equipment. Soon after this, the other branches published similar specifications until now most of them packaging metal parts and assemblies have their own specifications for Method II. As described in the Army and Navy Air Corps Specification, Method II is

> primarily designed to afford protection in shipment and storage to parts and equipment for which the nature and intended use of the unit, the destination of the unit, and the adaptability of this type of preservation and packaging to the unit, preclude other methods of packaging. Units adapted to this method, by virtue of their nature, may be expected to include engines, electrical and radio equipment, delicate instruments, propeller hubs, guns and other equipment where failure to provide for proper depreservation would be resultant in appreciable hazard to the unit and personnel involved in its use. Those adapted to this method, by virtue of destination, may be expected to include any equipment destined for War Zones or other critical areas where equipment and time for depreservation prior to use will not be available Those adapted, by virtue of their adaptability to the processes involved, may include all units whose shape, size, delicacy or other factor preclude other methods of preservation.

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4. Aircraft engine wrapped by Method II in pliofilm with silica gel bags. Photo Ford Motor Co. 5. The bags of silica gel are tied to metal parts before wrapping. They suck up corrosive moisture in the air and keep humidity within the 20 per cent limit. Photo the Permutit Co.

Even though the specifications written by the other services do not carry the same wording, they do, in effect, say the same thing.

The effectiveness of Method II rests equally on four interdependent factors:

1. *The volume of the enclosed air space.* Relative humidity is a measure at any given temperature of the amount of moisture which is contained in a given volume of air. The larger the volume of air to be dehydrated, the larger will be the quantity of moisture which must be removed to lower the relative humidity to the desired percentage. Thus, air volume should be at a minimum.

2. ***The area of the surface wrapper enclosing the space.*** All flexible moistureproof barriers are merely relatively impervious to moisture-vapor penetration. Thus, the larger the surface area, the greater will be the quantity of moisture vapor which will pass through it. It is important, then, that the barrier be so constructed as to result in the minimum surface area consistent with the contour and volume of the assembly.
3. ***The moisture-vapor transmission rate of the enclosing barrier.*** The quantity of moisture which will be transmitted through the moisture barrier under normally adverse conditions is far greater than that originally contained in the air of the enclosed volume. It is, therefore, important that the most moisture-impervious material which is applicable to specific conditions, be used.
4. ***The quantity of the adsorbent included in the package.*** The quantity of silica gel to be used in a given package is determined by:

   a) The total surface area of the barrier.
   b) The volume of the barrier.
   c) The amount of dunnage (wood, corrugated material, etc.) enclosed within the barrier.
   d) Length of time of protection period.

The formulas used to determine the proper amount of silica gel in a package are, for the most part, nearly the same for all branches.

Some specifications ask for protection for six months, while others require that the part be preserved for from 12 to 18 months. One branch, as an example, uses the following formula for one-year protection (A is the area in square feet of the barrier, D is the weight in pounds of any dunnage or blocking material enclosed within the barrier):

$$\text{Pounds of desiccant} = 0.2A + {}^1/_2D$$

Another incorporates the following formula for a six-month protective period (A = area in square feet of enclosing surfaces, V = volume in cubic feet of space enclosed, D = amount of dunnage [in pounds] enclosed within the barrier):

$$\text{Pounds of desiccant} = 0.08A + 0.02V + D$$

The requirements of the moisture barrier are basically the same for all the branches. They specify that the moisture-vapor transmission rate (MVTR) shall not exceed 0.25 gram of water vapor per 100 sq. in. per 24 hr., at 100 deg. F. and 95 per cent R. H. The more detailed specifications state that the creased as well as flat membrane shall have the above MVTR and that the seals effected in the fabrication operations as well as those made on the final closure of the barrier shall have the same MVTR or lower than the flat membrane. Certain transparent films and laminated foil combinations seem to have the desired qualities for moisture barriers and have been widely used by all the branches.

The proper design and engineering of a Method II application cannot be stressed too much, and there are certain fundamental rules for good practice in applying Method II which may be summarized as follows:

1. Select for the moisture barrier the most moisture-impervious material applicable.
2. Design the barrier so that it shall have the minimum surface area consistent with its application.
3. In the design of the package, the hygroscopic dunnage used inside the moisture barrier should be kept to a reasonable minimum.
4. Joints and seams must be moisture-impervious.
5. Use adequate silica gel.
6. Use only activated silica gel; never use saturated or partially saturated material.
7. Do not open the container in which the silica gel is shipped or stored until immediately before use, and reclose the container between uses.
8. Avoid purchasing silica gel in large shipping containers unless it is intended to use all the contained material in a minimum number of openings.

Without a doubt corrosion-prevention methods and practices approved and used during this period will continue after the war has ended. Never before has industry realized so much the need for proper packaging.

Listed below are a few of the specifications issued by the various branches on Methods I, I-A and II. Some were used as a reference for the above article:

100-14A, 39P16a } Army-Navy General Specifications for Packaging and Packing for Overseas Shipment.
TM 5-9711 Technical Manual—U. S. Engineers Corps.
10SSC-(a) Ordnance Field Service (now obsolete).
TM 38-305 Corrosion Prevention Processing and Packaging.
AN-C-67a Army-Navy Aeronautical Specification Containers; Moisture-Impervious.
AN-P-13 Army-Navy Aeronautical Specification Preservation and Packaging; Metal Parts & Equipment.
AN-O-P-406 Army-Navy Aeronautical Specification Plastics Film; Transparent Moisture-Impervious.
AN-O-S 366 Army-Navy Aeronautical Specification: Silica Gel; Dehydrating Agent.
AN-D-6 Army-Navy Aeronautical Specification, Silica Gel; Dehydrating Agent.
AN-P-12 Army-Navy Aeronautical Specification Paper; Greaseproof-Wrapping.
AN-C-52 Army-Navy Aeronautical Specification Compound; Exterior Surface Corrosion Preventative.
AXS-778 U. S. Army Ordnance Dehydrating Agent.
AXS-840 Rev. 1. U. S. Army Ordnance—Wrapping: Greaseproof.
U. S. A. 2-82 Compound, Rust Preventative, Heavy.
AXS-1001 Compound, Rust Preventative, Medium.
U. S. A. 2-84 Compound, Rust Preventative, Light.
AXS-673 Compound, Rust Preventative, Thin Film.
AXS-674 Oil, Lubricating, Preservative, Medium.
AXS-702 Oil, Lubricating, Preservative, Light.
ACS-777 Oil, Lubricating, Preservative, Special.

WAR PACKAGING MATE

Material	Use	Specifications	Special Properti
Heat-sealable coated lead foil, kraft and cloth	Method II—parts, assemblies, elec. equipment	100-14A[1] 39P-162 ANP-13 ANC-67A	Nearly zero water vapo mission. Strong a able, capable of stro seals
Heat-sealable coated lead foil, kraft	Method II—parts, small assemblies, elec. equipment, other uses, medical supplies, small arms ammunitions	100-14A 39P-16a ANP-13 ANC-67A	Nearly zero water vapo mission. Strong a able, capable of stro seals
Heat-sealable coated aluminum foil to cellulose acetate	K ration components, beverage powders, powdered coffee	C. Q. D., 23E	Nearly zero water vapo mission, light weig bulk, strong heat seal
Heat-sealing cellophane laminated to lead foil to kraft	Bulk packaging of dehydrated foods. Special uses under Method 1-A for Grade B metal parts	C. Q. D., 59D, 60D, 72D, 74C AXS-840, Rev. 1	Nearly zero water vapo mission. Strong, hea able
Vinyl films	Waterproof, flexible, strong protective covers	P. Q. D., 377	Waterproof, greaseproo ible with strong heat
Laminated pliofilm	Method II—airplane engines and parts	ANOP-406 ANP-13 ANC-67A	Low water vapor perm. parent, flexible, heat-s
Laminated cellophane[3]	Bag for Ration K, etc., components	C. Q. D., 28F	Low water vapor transm Durable and heat-se Water resistant
Grade A materials[2]	Wrapper or package for precision parts. Method I or I-a (if waterproof and sealable)	AXS-840, Rev. 1 U. S. Army 100-14A U. S. Navy 39P-16a	Greaseproof, non-cor wax free. Red color
Grade B materials	Wrapper or package for non-precision or non-metallic parts. Method I	AXS-840, Rev. 1 U. S. Army 100-14A U. S. Navy 39P-16a	Greaseproof. Wax free added color
Grade C materials	Wrapper or package for precision parts. Method I-a	AXS-840, Rev. 1 U. S. Army 100-14A U. S. Navy 39P-16a	Greaseproof, non-cor moldable and se Green color
Vinylidene chloride (Saran)	Method II—machine guns, optical instruments		Strong, flexible, transp low water vapor transm
Creped kraft and asphaltic laminant (Multiply)	Waterproof package or carton liner for many uses. Special Method II application	100-14A 39P-16a	Flexible, tough, water Pressure-sealable

NOTE 1. This reference is the "Army-Navy General Specifications for Packaging and Packing for Overseas Shipment," U
also covers many other agencies and gives the basic intent and requirements of many materials and methods.
NOTE 2. Many other War Agencies have detailed Spec. for various and specific applications of these or similar material
NOTE 3. The bulletin "Military Parts Packaging" by the Cellophane Division of the Du Pont Co., Oct. 25, 1943, gives m
condensation of metal parts packaging and lists many specifications and uses.

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WAR PACKAGI

Use	Specifications
II—parts, assemblies, uipment	100-14A[1] 39P-162 ANP-13 ANC-67A
II—parts, small as-s, elec. equipment, es, medical supplies, rms ammunitions	100-14A 39P-16a ANP-13 ANC-67A
omponents, beverage , powdered coffee	C. Q. D., 23E
aging of dehydrated Special uses under 1-A for Grade B arts	C. Q. D., 59D, 60D, 72D, 74C AXS-840, Rev. 1
f, flexible, strong ve covers	P. Q. D., 377
I—airplane engines s	ANOP-406 ANP-13 ANC-67A
ation K, etc., com-	C. Q. D., 28F
r package for preci-ts. Method I or I-a rproof and sealable)	AXS-840, Rev. 1 U. S. Army 100-14A U. S. Navy 39P-16a
r package for non- or non-metallic Method I	AXS-840, Rev. 1 U. S. Army 100-14A U. S. Navy 39P-16a
r package for preci-ts. Method I-a	AXS-840, Rev. 1 U. S. Army 100-14A U. S. Navy 39P-16a
—machine guns, op-ruments	
f package or carton many uses. Special II application	100-14A 39P-16a

General Specifications for Packaging and Packi
e basic intent and requirements of many materi
etailed Spec. for various and specific application
aging" by the Cellophane Division of the Du Po
sts many specifications and uses.

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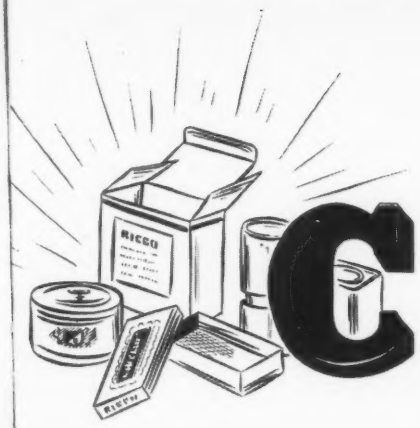
KAGING MATERIALS

ations	Special Properties	Construction	Material Manufactured by
	Nearly zero water vapor transmission. Strong and durable, capable of strong heat seals	Polyvinyl butyrate coated lead foil laminated to kraft adhered to cloth	Reynolds Metals Co. Shellmar Products Co.
	Nearly zero water vapor transmission. Strong and durable, capable of strong heat seals	Polyvinyl butyrate coated lead foil laminated to kraft paper with flexible asphaltic laminated agent	Reynolds Metals Co. Shellmar Products Co.
	Nearly zero water vapor transmission, light weight and bulk, strong heat sealing	Vinyl lacquer on aluminum foil laminated with colored adhesive to printed cellulose acetate	Dobeckmun Co. Shellmar Products Co. Milprint, Inc.
50D, 72D, 74C 1	Nearly zero water vapor transmission. Strong, heat-sealable	Lead foil laminated to kraft with asphaltic agent. Added lacquer coating on cellophane laminated to metal side	Reynolds Metals Co.
	Waterproof, greaseproof, flexible with strong heat seals	Single ply, heat sealed	Goodyear Tire & Rubber Co. Carbide & Carbon Chemical Corp. Celanese Celluloid Corp.
	Low water vapor perm. Transparent, flexible, heat-sealable	Two plies pliofilm with flexible, strong lam. agent	Goodyear Tire & Rubber Co. Shellmar Products Co.
	Low water vapor transmission. Durable and heat-sealable. Water resistant	Flexible, heat sealing anchored coated cellophanes with flexible waxy lam. agent	Menasha Products Co. Dobeckmun Co. Shellmar Products Co.
1 0-14A P-16a	Greaseproof, non-corrosive, wax free. Red color	AXS-840, Revision 1 is a performance specification which can be met by many materials and combinations. Greaseproofness is obtained by coatings, glassine, cellophane and cellulose acetate. Strength by papers or transparent films alone or multiply or with cloth	Suppliers listed by Forest Products Laboratories
1 0-14A P-16a	Greaseproof. Wax free. No added color		
1 0-14A P-16a	Greaseproof, non-corrosive, moldable and sealable. Green color		
	Strong, flexible, transparent, low water vapor transmission	Extruded tubes	Dow Chemical Co.
	Flexible, tough, waterproof. Pressure-sealable	Multi-plies of stretchable materials with asphaltic laminant	Cincinnati Industries

g and Packing for Overseas Shipment," U. S. Army Spec. No. 100-14A, U. S. Navy Spec. 39P-16a. This manual many materials and methods.
e applications of these or similar materials.
of the Du Pont Co., Oct. 25, 1943, gives more details on the uses of cellophane. This Bulletin is an excellent

eserved including the right to reproduce this chart or portions thereof in any form.

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CARTONS AND BOXES

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New importance of paper in packaging

by R. G. Macdonald

V-boxes, ordnance wraps, water-vapor permeability, microcrystalline waxes, greaseproofness, paper-base plastics, super-weatherproof containers, are terms that are new or have a new meaning to the paper industry. For years the industry, like other basic industries, produced papers on a tonnage basis, very much as pig iron and ingots are produced by the metal industries.

The customers for the paper were largely convertors, large printing establishments, large packers or merchants.

The function of the latter was to accept large consignments of paper or board and to repackage and distribute to a multitude of users in a restricted area. The average mill turns out thousands of tons of a single paper or of several closely related kinds of paper such as newsprint, kraft paper, tissue, sulphite paper, printing papers, paperboards, glassine, writings, etc. A few mills made so-called specialties—paper having certain definite physical and chemical properties.

The converting industries took these papers and made boxes, wrappings, coated papers, impregnated papers, laminated papers, decorated papers, tissues for individual uses and other modifications.

Ready for war

The war has changed the industry in many respects, and has forced it to apply its technical skill to meet the new conditions. It has had to meet the demands of the armed forces for paper products not heretofore known, and it has had to aid civilian economy by supplying materials to replace inadequate supplies of such other materials as metals, textiles, glass, etc.

Fortunately for the emergency, although less fortunate for its own well-being in ordinary times, paper making has long been characterized by a state of overproduction. The everlasting pressure for these products has, almost from its beginning, kept it in an expanding phase. It has, therefore, followed the receding forests, and has opened up tremendous new regions. The advent of the war followed the establishment of new pulp and paper endeavors in the Pacific Northwest and in the South.

The business cycles have caught the expanding industry from time to time, and have caused great hardship because, with its high fixed charges, it is the type of industry that must continuously run full and efficiently to be profitable. When tight conditions are met, there is a great temptation to keep the mills running on the theory that the fixed charges go marching on whether the mill runs or not. It has always seemed better to produce paper even though no profits were possible. The laws of supply and demand apply to this industry as well as to all others, but the tendency to violate such laws has been common, and the results have been painful.

A few of the more progressive companies have recognized this law, and realizing that demand in normal times—and particularly in so far as the paper industry is concerned—is the thing that needs special attention, have done something about it. The answer is obvious to such companies. As a result of intelligent and adequately supported research and practical development, one company in the depth of the last depression ran full capacity, and more than half of its production was of kinds of papers not known even five years previously.

A similar development was seen in many other companies. In some cases the products were not new, but their processes and equipment and engineering efficiencies were relatively new and produced the same desired results in the ledgers. These efforts were the result of good management, technical consciousness, proper financing and, to some extent, good salesmanship.

This is the background of a great industry that entered the war period with but little expectation of what was before it. The demand grew rapidly, the machines turned out more of its staple products, and the industry quickly found that the product had to be different and better. Even with its normal overproduction, its capacity became strained, and gradually many end products had to be discontinued. Essentiality became a new criterion, especially when wood-pulp shortages entered the picture.

How the problems were met

The Quartermaster began asking for papers and boards that would do the job formerly accomplished by the tin can and textiles. The ordnance services started to talk about corrosion prevention, and all services demanded that materials be packed so that they would reach the fronts—wherever they might be—in as good condition as when originally wrapped or put in a container. Dehydrated and quick-frozen foods had to be packaged and delivered in usable condition. These were but a few of the new conditions that had to be met as new problems.

Fortunately, the paper industry was not entirely unprepared. It had the raw materials, the machine capacity and the technical ingenuity required to weather the storm in its most critical times. The story of the growth of machine capacity and raw materials has been told. The story of the industry's technical resources is equally interesting. In 1915, when the Technical Association of the Pulp and Paper Industry was formed, it was difficult to find 100 men who might be qualified for its membership. Production was the important consideration. If paper could be made, it could be sold, and the emphasis was on mill tonnage of a few major grades of paper. When the production superintendents could do no more, the great electrical engineering firms entered the picture and proceeded to redesign and rebuild the machine drives until the goal of 1000 ft. per minute was reached and passed.

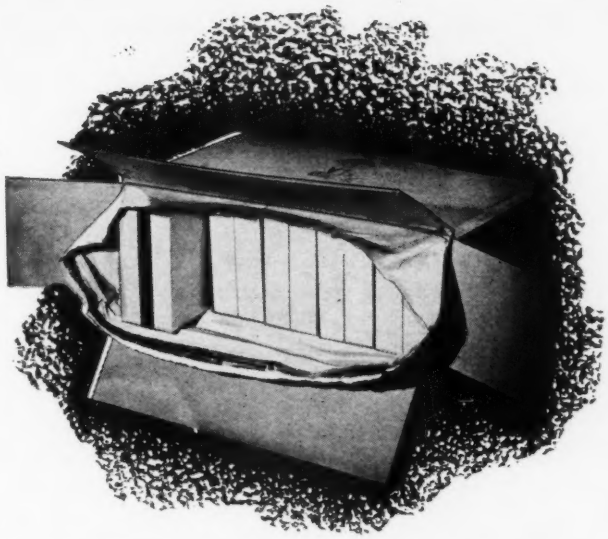
The few technical men—first graduate engineers, later chemists and other technologists—who entered the industry in pre-World War I days found that they needed to learn practical papermaking as soon as possible. There were no adequate textbooks, not much technical literature of value for their education. Quality was not yet a vital requirement. The first World War changed the technical picture. Manpower shortages were acute and, when it was over, the need for rehabilitation and the careful training of a new type of manpower was completely evident.

The national program in all industry in regard to the elimination of waste in all forms hit the paper industry and demonstrated the need for a type of personnel that could look upon the industry's operations with a fresh and scientifically trained viewpoint. This brought in another batch of young technical men, most of whom had chemical or engineering degrees. Then followed a period of steady assimilation of such men. It was a somewhat painful one since it introduced a new element that was only slowly appreciated, and to some extent resented, by the older operators who had grown up in an industry interested primarily in tonnage. The trek of technical men into paper then became as steady as that of the pioneers across the great plains in the Forties and Fifties.

Their presence was increasingly felt, first in waste elimination, cost reduction and quality control, later in research and planning services, and more recently in technical services to the convertors and the consumers. The NRA required the establishment of quality standards as a basis for open price fixing. Therefore more technical men were needed. In the Twenties the concept of research began to take hold. A few of the larger companies began establishing departments to deal with technical problems not entirely related to production but concerning the future and new ideas, particularly those related to processes.

By 1930 the industry, beginning to get ready for its great research and advanced education, established The Institute of Paper Chemistry at Appleton, Wisconsin. It started first with two students and one instructor and almost no budget, and entered the present war with a staff of more than 100 and an annual budget in excess of $500,000. Its products have been a steady outflow of Ph.D.'s and research results of great importance. The willingness to support such an institution would have been difficult to imagine at the time TAPPI was being born.

This account of the paper industry's background covering only a few decades is interesting primarily from the standpoint of timing. It had to go through a considerable metamorphosis since 1915 to have the wonderful resources available when the great challenge came at Pearl Harbor. No industry or organization could have controlled its technical evolution any more perfectly. Other industries have done as well. A few, such as the aviation, radio, aircraft and chemical industries, have had the benefit of being young and highly technical from the start. The synthetic rubber industry's progress has been spectacular, but it may be considered as a branch of the highly technical and progressive chemical industry.



With a long history of research behind them, the paper and paperboard industries were ready for the problems presented by the war. Typical are all the various kinds of paper which go into the making of this completely waterproof medical pack developed for use by the Army

The war presented the paper and paperboard industries with problems that they could solve because they were ready in most respects. Many of the problems would probably never have had to be considered under normal conditions. The export container and many Army and Navy products were highly specialized. Normal commerce may never require containers that need be expected to meet conditions of salt water immersion. The substitution of paper products for other materials has given users of such products an unusual opportunity to appraise them in terms of utility as well as of economy and general suitability.

The endless lists of products made of paper have filled the pages of the trade and general publications. Paper has had the opportunity to be introduced into nearly all possible fields of manufacturing activity. It was almost the only material that was still available for fabrication. Only the restrictions applied to the manufacture of many things prevented paper from being tried out in all fields of endeavor, but it has had its chance and will probably remain in many fields, especially that of packaging where it has made its greatest and most important contribution to the war effort.

The industry with its tremendous resources has been given the opportunity to complete its service, and will continue to be fully conscious of the use requirements of its end products. In making this great advance, the paper industry has gained a greater appreciation not only of the fundamental importance of technology, but of the functions of allied industries which make adhesives, coatings, impregnants, chemicals and machinery. Paper alone could not do the job, but as a group, the contributors to the modern paper package and container can continue to add to the material wealth of this great country.

Wood pulp in the paperboard industry

by J. D. Malcolmson

Wood is made up in about equal quantities of two principal ingredients, *cellulose* and *lignin*. The cellulose consists of tiny individual fibres which are tough and flexible and almost white in color. Cotton is cellulose in almost pure form. Lignin is a dark-colored cement which binds these fibres together and gives wood its hardness and structural strength. Lignin is of no value to the papermaker and must be cooked out and discarded in order to make available the valuable cellulose fibres. There are only a very few chemicals which will cook this lignin out economically without injuring the cellulose.

Wood pulp is classified according to the manufacturing method by which it is produced. The two principal classifications are: 1. Groundwood or Mechanical Pulp; 2. Chemical Pulp.

Groundwood pulp—Groundwood pulp is produced by grinding a peeled log against a revolving stone (natural or artificial). This constitutes the lowest quality of pulp manufactured because of the inferior strength, short length, stiffness of the fibres and impurity of the pulp. These bad qualities are due to the retention of all of the lignin. It is generally used in conjunction with some other longer-fibred pulp and finds its greatest use in the manufacture of newsprint, tissues, paperboard, and cheap magazine and pad papers. Picnic pie plates are 100% groundwood. Newsprint is about 85% groundwood. The yellowing and loss of strength of newsprint with age is due to the lignin in the groundwood. Occasionally the wood is steamed before grinding, which causes a better separation of the fibres. The woods commonly used are spruce, hemlock, balsam, fir, aspen, poplar and willow.

Chemical pulps—Chemical pulps are produced by cooking the wood, which has been reduced to chips about an inch square, in large metal digesters with chemicals under high heat and pressure. This serves to separate the cellulose (or pure fibres) from the lignin and other impurities. The impurities are dissolved in the cooking liquid and the degree of cooking determines the purity and also the physical characteristics of the pulp. Any of the chemical pulps may be bleached, which consists of whitening the pulps by the use of a bleaching chemical.

There are three principal kinds of chemical pulp.

1. *Soda Pulp* is cooked with a solution of caustic soda (sodium hydroxide). It is a weak, soft, pure pulp used largely in book and magazine papers. It is seldom used in the manufacture of paperboard except for a small amount in the top liner of white patent-coated board. The woods commonly used are spruce, hemlock, aspen.
2. *Sulfite Pulp* is an acid pulp, produced by a liquor which is a mixture of the bi-sulfites of calcium and magnesium. This pulp, which combines very high purity with good strength, is used in high-grade writing papers, book papers, folding boxboard, tissues, and also as the base for artificial silk and plastics. The "white patent coated" surface of folding boxboard is mostly bleached sulfite. Woods used for this are the same as for soda pulp.
3. *Sulfate Pulp* is an alkaline pulp produced by gentler cooking with a mixture of caustic soda (sodium hydroxide) and sodium sulfide. It is stronger but less pure pulp, containing enough lignin to add cementing matter. *Kraft Pulp* is an under-cooked sulfate pulp which is the strongest but the most impure sulfate pulp. Considerable success has been enjoyed in bleaching rather well-cooked sulfate pulp to make a very strong and very white sheet, with better bending qualities than sulfite stock.

   Bleached sulfate is often used for the topping on corrugated liners or for sheet-lined board, but not for white patent coated board. The principal woods used are long-fibred conifers such as jack pine, southern pine, spruce, cypress, redwood, and larch.

Principal paperboard products of wood pulp*

Paperboard is made as much as possible of old papers. Old papers contain the same fibres as new pulp yet they are cheaper. New pulp is added in sufficient proportion to bring the strength, bending quality and color up to the required standard. Because of the many grades of waste papers and pulp, and the multi-cylinder construction of a board machine, it is possible to produce an almost infinite variety of boxboards. Among the most common are the following:

Chip—Made up almost entirely of mixed papers. Occasionally stronger fibres are added to produce *test chip*. The filler of most vat lined paperboards is chip.

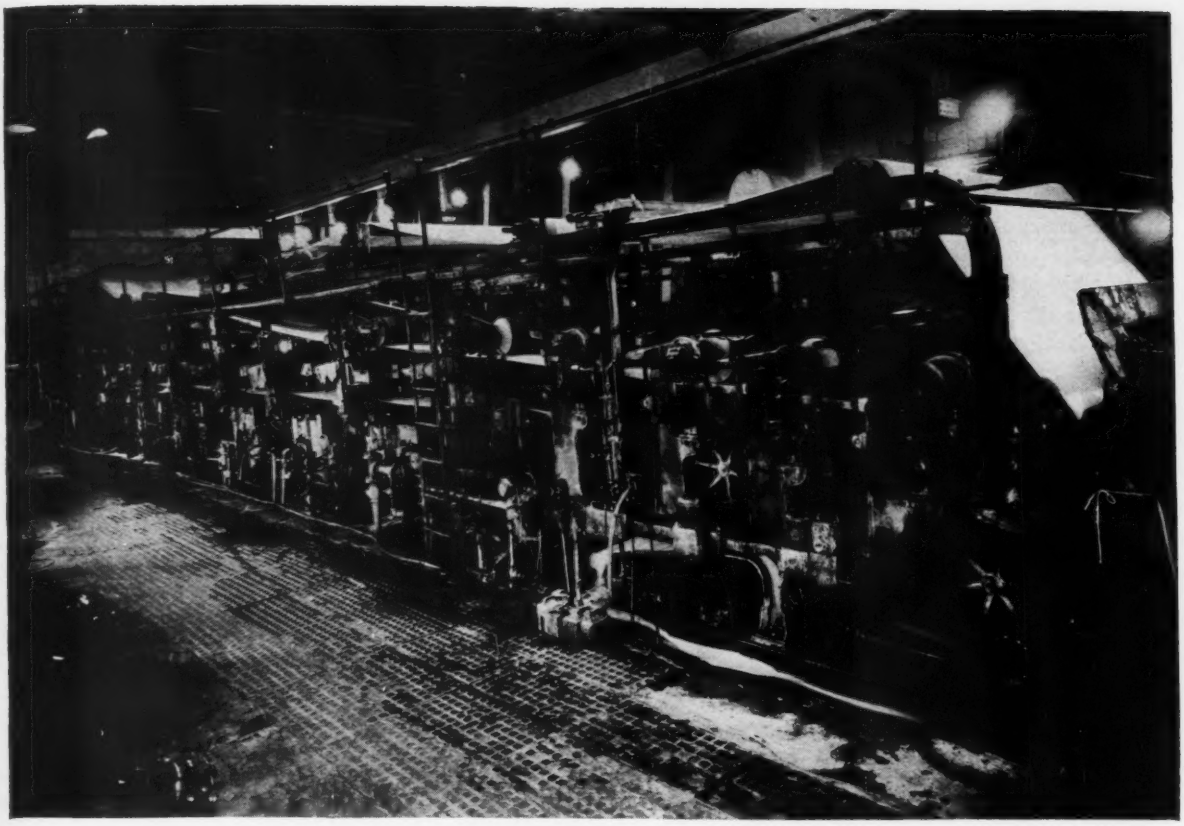
News—Made of old newspapers. The gray color is due to disseminated printer's ink. News is usually used as the inner surface of other boards (e.g., "White patent coated news back"). Occasionally boards are made of *solid news*.

Manila—Name derived from manila rope fibres, but manila today contains no rope fibres. Boards and papers are still made of these fibres but the product is called "rope paper." Manila has come to mean a yellowish sheet containing 50% or more of groundwood.

Non-bending manila—About $^2/_3$ groundwood, $^1/_3$ unbleached sulfite, plus some yellow dye.

Bending manila—The same except that the proportions are about 50–50.

* WPB Order L-239, dated Jan. 8, 1943, specifically limits paperboard production as to percentages of used and virgin pulp for certain purposes. See "Folding Box Directives."



Cylinder paperboard machine for making folding boxboard of gauge .016 to .045 at a maximum rate of 115 tons per day. The process begins with the entrance of pulp at one end. It emerges from the other in 118-in. widths. Photo Robert Gair Co., Inc.

Bleached manila—The same as the two listed above except that the yellow dye is omitted and some blue and red are added to neutralize the yellow of the groundwood.

White patent coated—Usually has a top liner made of bleached sulfite pulp, unbleached sulfite pulp, and some soda pulp. Waste paper from envelope factories, etc. (known as *hard white shavings* and *soft white shavings*), are substituted for the more expensive sulfite pulps wherever possible. The filler is usually chip.

Manilas—Patent coated and other grades can be colored in the beater (beater color) or on the calender (calender stain). They are then called yellow patent coated news, orange calender stained manila, etc.

Mist board—Usually has top of news, or news and sulfite to which has been added some dyed kraft fibres.

Solid boards—Usually have a more expensive filler than chip. Examples are *Solid Sulfite* and *Solid Manila* (groundwood). Solid boards often have a top liner different from the filler such as *White Patent Coated Solid Manila*.

Container boards—More attention paid to strength than to color whereas folding box boards (listed above) are more concerned with appearance and bending quality.

Test liners—Used on corrugated and solid fibre shipping containers must meet official Mullen test.

Jute liners—Test liners made from re-worked papers plus enough new pulp (usually kraft) to meet the required specifications on strength. Most of the new kraft pulp is concentrated on the outer skin or "top liner," and on the second layer or "under liner."

Kraft liners—Made of solid new kraft pulp, they are lighter in weight than jute but more expensive per ton.

Fourdrinier kraft liners—Made on a single wire screen and have no vat lined formation. They are lighter in weight than "*Cylinder Kraft Liners.*" *Dry Finish* Fourdrinier Kraft Liners are lighter in weight than *Water Finish* Fourdrinier Kraft Liners.

Filled kraft liners—Intermediate between *Jute* and *Cylinder Kraft* in that they contain $^3/_4$ or more of new kraft pulp. The term is indefinite.

Corrugating sheets—Usually .009 thick and made of a variety of raw materials, the most popular of which are wheat straw and solid kraft. *Mill Straw* consists of high-grade stock chemically treated to increase rigidity.

None of the above sheets contains adhesive, their only lamination being the plies of the vat lined sheets made on a cylinder machine. They can be combined with adhesives to other sheets to form an almost endless variety of combined products such as solid fibre-board, corrugated board, pasted chip, sheet-lined boards, caddy board, wallboard, etc.

Boxboard—types & selection

by Grafton Whiting

Folding cartons and set-up boxes are made from boxboard which is manufactured on a multi-cylinder paper machine. The function of this machine is to draw a film or web of fibres from each cylinder (usually 5 to 8 cylinders) and, by subsequent pressure, to form a compact sheet. Each cylinder turns in a vat supplied with the raw stock (about 1 per cent fibre and 99 per cent water) from which the board is to be made. This supply may consist of fibres reclaimed from waste paper, or of virgin pulp fibres, or a mixture of these according to the specifications of the board to be produced. The first and last cylinders form the two outside liners or surfaces of the board, while the remaining cylinders produce the filler, or inner plies. The thickness of each ranges from .002 of an inch upward, depending upon the adjustment of the machine.

Since any type of fibre may be furnished to the cylinders, and each cylinder forms a part of the construction of the board, a wide variety of boxboards can be made.

There are certain grades of board in common use for folding and set-up boxes, made of different materials and different thicknesses, dependent upon the size and style of the box and the use to which it will be put. The thickness or caliper is expressed in thousandths of an inch—termed "points"—and ranges from .012 to .065 of an inch.

Table 1 (insert chart) lists the grades, together with caliper range and, in general, the materials from which they are made. Waste papers, the chief source of raw material, are sorted into many classes, each commanding a different price, according to the fibre content. Papers containing strong, white fibres bring the highest price and from there range downward to mixed papers, the lowest class. Pulp, although the average use is less in volume, is an important element in many finishes in producing the quality and surface effect required. There are three kinds of pulp in common use; namely, sulfite, sulfate or kraft, and groundwood. These may be unbleached or bleached and prices vary accordingly.

When the importation of European pulp was cut off in 1940 it was feared that the domestic and Canadian output would be insufficient to supply the market requirements. To meet this situation, the paperboard mills increased their usage of waste papers, particularly of the better grades, to substitute in part these reclaimed fibres for new pulp. Although no serious shortage occurred in 1941 and 1942, the continued and increased substitution in 1943 has brought about a depletion of inventories of waste paper. Receipts have fallen so far short of consumption, that curtailment of production has been necessary in some mills for lack of the important raw material. However, this does not affect the tabulation of the materials used, but refers only to the relative amount of each that is required.

Boards

Solid boards—General term indicating that the board is made of the same material throughout.

Filled boards—Board with inner plies of a stock different from that of the outer plies or liners.

Pasted board—Board made of two or more sheets of board or of board and paper pasted together by a subsequent operation.

Vat lined board—Board made on a cylinder machine where the first or last cylinder vat is supplied with a quality of stock different from that in the other vats. Double vat lined board requires that both the first and last vats contain different stocks.

Color

Manila—Term used to indicate a color (yellowish) and appearance comparable to that formerly obtained when manila hemp (rope) was used.

Beater colored—Coloring material is added to the paper stock before entering the cylinder vat, thus impregnating the whole ply.

Calender colored (or stained)—Coloring material is applied to the surface of the board as it passes through the calender stack, thus coloring the top but not necessarily permeating throughout the ply.

Chemicals

Various chemicals, such as rosin and alum for sizing, are used in making boxboard to prevent the penetration of moisture. Starch is used for hardening and stiffening. Loading material, such as clay, is also used. Emulsions, such as asphalt for water-proofing, and dyes and pigments for procuring the desired color, are also employed. With these applied to the paper stock, any one or all of the plies may receive treatment to suit requirements.

Finish

Dry finish—Finish obtained when board passes through calender stack without special treatment.

Wet finish—Surface of the board is subjected to a water or steam bath in passing through the calender, which gives it a smoother finish. This is somewhat similar to dampening cloth before pressing.

Surface treatment—Treatment of the surface of the board may be made at the calender either before passing through the stacks or as some step in the operation. For example, silicate is applied to the board to prevent penetration of grease in the packaging of foods. Starch or other sizing is used to give a smoother finish for certain types of printing. Paraffin or wax is applied as a water-proofing agent where the board is to be used for the packaging of liquids or semi-liquids. It is common practice in folding-box plants to coat with paraffin or wax for this same purpose.

BOXBOARD—GE

TAB

GRADES	Caliper Range in Inches	Waste	
		Mixed Papers	
FOLDING			
Chip (bending)	.012–.050	x	
Mist Gray Suit Board	.020–.040	x	
Manila Lined Chip	.012–.050	x	
Bleached Manila Lined Chip	.012–.050	x	
Kraft Board	.012–.050		
White Patent Coated News	.012–.028		
Clay Coated Board	.012–.028		
Bleached Sulphite Board	.016–.024		
SET-UP			
Chip (non-bending)	.016–.065	x	
News Vat Lined Chip	.016–.065	x	
Filled News	.016–.065	x	
Solid News	.016–.065		
White Vat Lined Chip	.016–.065	x	

NOTE: The proportion and selection of raw materia
Price index is based upon chip (non-bending
rials entering into costs vary independently.

T

BOXBOARD GRADES	Butter Boxes	Candy Boxes	Cereal Cartons	Cigarette Cartons
Chip (bending)		x	x	
Mist Gray Suit Board				
Manila Lined Chip				
Bleached Manila Lined Chip			x	x
Kraft Board				
White Patent Coated News			x	x
Clay Coated Board				x
Bleached Sulphite Board	a		x	
Chip (non-bending)		c		
News Vat Lined Chip			x	
Filled News				
Solid News				
White Vat Lined Chip		c		

a—greaseproof, b—waterproof, c—lined with cover
NOTE: The boxboard selected for any type of prod
the price, and the degree to which the sales

No. 1 Gauge List—Non-Bending B

1. Plain Strawboard.
2. Plain Chipboard.
3. Filled Wood Pulp.
4. Filled News Boar
5. Single News Vat
6. Single White Va

Regular Number 50 Lb. Bdl.	FINISH			
	1	2	3	4
Quan.	Inch	Inch	Inch	Inch

XUM

OARD—GRADES, GAUGE LISTS, TYPES

TABLE 1—Grades of Boxboard

Caliper Range in Inches	FURNISH									Price Index
	Waste Papers Composed Principally of					Pulp				
	Mixed Papers	News	Ground wood	Sulphite Fibres	Old Ct, rs.	Sulphite	Kraft	Ground wood	Clay	
.012–.050	x	x			x					110
.020–.040	x	x			x	x	x			130
.012–.050	x	x	x		x	x		x		130
.012–.050	x	x	x		x	x		x		140
.012–.050							x			130
.012–.028		x	x	x		x				160
.012–.028		x		x		x			x	220
.016–.024						x				250
.016–.065	x	x								100
.016–.065	x	x			x					105
.016–.065	x	x			x					110
.016–.065		x								115
.016–.065	x		x	x	x	x		x		130

tion of raw materials in a furnish may vary depending on availability of supply and quality required. chip (non-bending) equal to 100%. The relation of other grades is only typical since the several mate- ary independently.

TABLE 2—Types of Boxes

	Butter Boxes	Candy Boxes	Cereal Cartons	Cigarette Cartons	Cosmetics	Drugs (bottled)	Dried Fruit Cartons	Eggs (local delivery)	Envelopes (Stationery)	5-Cent Candies	Florists' Boxes	Frozen Foods	Hardware	Ice Cream	Jewelry Boxes	Liquor (bottled) Cartons	Milk Bottles	Salt Cartons	Shoe Boxes	Soap (flakes)	Sausages, Bacon, etc.	Suit Boxes	Stocking Boxes	Tooth Paste Cartons	Vegetable and Fruit Cartons
		x	x					x														x			
			x	x			b x	x		x			x x		c			b	x	a	a	x			b
			x	x	x	x x					x		x			x x				a	a				b
	a		x	x	x	x					x	b		b	x	x x	b			a a	a a			x	
		c						x	x c	x	c		x					c	c		a		c		
			x		x			x	x c	x			c x		x			c	c				c		x
		c			c			x	c				x		c										

—lined with cover paper.
r any type of product may vary from a high to a low grade depending upon the service required of it, to which the sales appeal in the appearance of the package is a factor in the merchandising policy.

on-Bending Boards

. Filled News Board.
. Single News Vat-Lined Chip.
. Single White Vat-Lined Chip.

NISH		Weight per M Sq. Ft.
3	4	
Inch	Inch	Lbs.

No. 4 Gauge List—Solid News Solid Wood Pulp

Regular Number 50 Lb. Bdl.	FINISH				Weight per M Sq. Ft.
	1	2	3	4	
Quan.	Inch	Inch	Inch	Inch	Lbs.
40	.061	.058	.053	.049	180
45	.054	.052	.048	.043	160
50	.049	.047	.043	.039	144
55	.045	.043	.039	.035	131

FOLDING
Chip (bending)
Mist Gray Suit Board
Manila Lined Chip
Bleached Manila Lined Chi
Kraft Board
White Patent Coated News
Clay Coated Board
Bleached Sulphite Board
SET-UP
Chip (non-bending)
News Vat Lined Chip
Filled News
Solid News
White Vat Lined Chip

NOTE: The proportion and
Price index is base
rials entering into

BOXBOARD GRADES
Chip (bending)
Mist Gray Suit Board
Manila Lined Chip
Bleached Manila Lined Ch
Kraft Board
White Patent Coated News
Clay Coated Board
Bleached Sulphite Board
Chip (non-bending)
News Vat Lined Chip
Filled News
Solid News
White Vat Lined Chip

a—greaseproof, b—waterp
NOTE: The boxboard sele
the price, and the

No. 1 Gauge Lis

1. Plain Strawboard.
2. Plain Chipboard.
3. Filled Wood Pulp.

Regular Number 50 Lb. Bdl.	1
Quan.	Inch
35	.065
40	.057
45	.051
50	.046
55	.041
60	.038
65	.035
70	.032
75	.030
80	.028
85	.026
90	.024
95	.023
100	.022
110	.019
120	.017

No. 2 Gauge

1. Single Manila Lined Ch
2. Bleached Manila Lined C
3. Double Manila Lined C
4. Colored Boxboard Chip
5. Bending Chipboard.
6. Colored Suit Box Chip B

Regular Number 50 Lb. Bdl.	1
Quan.	Inch
40	.052
45	.047
50	.042
55	.038
60	.035
65	.031
70	.029
75	.027
80	.025
85	.023
90	.021
95	.020
100	.019
105	.018
110	.017
120	.016

No. 3 Gaug

Regular Number 50 Lb. Bdl.	Rou
Quan.	In
10	.2
15	.1
20	.1
25	.0
30	.0
35	.0

OLDING												
ding)	.012–.050	x	x			x						110
Suit Board	.020–.040	x	x			x	x	x				130
ed Chip	.012–.050	x	x	x		x	x		x			130
Manila Lined Chip	.012–.050	x	x	x		x	x		x			140
d	.012–.050							x				130
nt Coated News	.012–.028		x	x	x		x					160
ed Board	.012–.028		x		x		x				x	220
Sulphite Board	.016–.024						x					250
ET-UP												
-bending)	.016–.065	x	x									100
Lined Chip	.016–.065	x	x			x						105
s	.016–.065	x	x			x						110
s	.016–.065		x									115
Lined Chip	.016–.065	x		x	x	x	x		x			130

e proportion and selection of raw materials in a furnish may vary depending on availability of supply and quality required. ice index is based upon chip (non-bending) equal to 100%. The relation of other grades is only typical since the several mate- ls entering into costs vary independently.

TABLE 2—Types of Boxes

BOXBOARD GRADES	Butter Boxes	Candy Boxes	Cereal Cartons	Cigarette Cartons	Cosmetics	Drugs (bottled)	Dried Fruit Cartons	Eggs (local delivery)	Envelopes (Stationery)	5-Cent Candies	Florists' Boxes	Frozen Foods	Hardware	Ice Cream	Jewelry Boxes	Liquor (bottled) Cartons	Milk Bottles	Salt Cartons	Shoe Boxes	Soap (flakes)	Sausages, Bacon, etc.	Suit Boxes	Stocking Boxes	Tooth Paste Cartons	Vegetable and Fruit Cartons
ding)		x	x					x	x																
Suit Board																									
ned Chip																									b
Manila Lined Chip			x	x		x		x		x			x		c			b	x	a	a				
rd						x	b				x		x									x			b
ent Coated News			x	x		x										x				a	a				
ted Board				x	x	x									x	x				a	a				
Sulphite Board	a		x								c	b		b			b			a	a			x	
-bending)		c						x	c				x					c	c		a		c		
Lined Chip			x		x			x	x	x			c		x				c				c		x
ws																									
s								x	c				x												
t Lined Chip		c			c										c										

proof, b—waterproof, c—lined with cover paper.
he boxboard selected for any type of product may vary from a high to a low grade depending upon the service required of it, e price, and the degree to which the sales appeal in the appearance of the package is a factor in the merchandising policy.

1 Gauge List—Non-Bending Boards

trawboard.
hipboard.
Wood Pulp.
4. Filled News Board.
5. Single News Vat-Lined Chip.
6. Single White Vat-Lined Chip.

ar er Bdl.	FINISH 1	2	3	4	Weight per M Sq. Ft.
n.	Inch	Inch	Inch	Inch	Lbs.
	.065	.061	.058	.052	206
	.057	.054	.051	.046	180
	.051	.048	.046	.041	160
	.046	.043	.041	.037	144
	.041	.038	.036	.033	131
	.038	.035	.033	.030	120
	.035	.032	.030	.028	111
	.032	.030	.028	.026	103
	.030	.028	.027	.024	96
	.028	.026	.025	.023	90
	.026	.024	.023	.022	85
	.024	.022	.021	.020	90
	.023	.021	.020	.018	76
	.022	.020	.019	.017	72
	.019	.018	.017	.016	65
	.017	.016	.015	.014	60

No. 2 Gauge List—Bending Boards

Manila Lined Chip.
ed Manila Lined Chip.
Manila Lined Chip.
d Boxboard Chip Back.
g Chipboard.
d Suit Box Chip Back.
7. Mist Color Suit Box Chip Back.
8. Cracker Shell Board.
9. Solid Jute.
10. Any combination with Chip, News or Pulp Back.

ar er Bdl.	FINISH 1	2	3	4	Weight per M Sq. Ft.
n.	Inch	Inch	Inch	Inch	Lbs.
	.052	.049	.047	.045	180
	.047	.045	.042	.040	160
	.042	.040	.038	.036	144
	.038	.036	.034	.032	131
	.035	.033	.031	.029	120
	.031	.030	.028	.026	111
	.029	.028	.026	.024	103
	.027	.026	.024	.023	96
	.025	.024	.023	.021	90
	.023	.022	.021	.019	85
	.021	.020	.019	.018	80
	.020	.019	.018	.017	76
	.019	.018	.017	.016	72
	.018	.017	.016	.015	69
	.017	.016	.015	.014	65
	.016	.015	.014	.013	60

No. 3 Gauge List—Pasted Chip

ular nber . Bdl.	FINISH Rough	Smooth	Weight per M Sq. Ft.
an.	Inch	Inch	Lbs.
0	.216	.206	720
5	.144	.138	480
0	.108	.103	360
5	.086	.081	288
0	.070	.065	240
5	.060	.058	206

No. 4 Gauge List—Solid News Solid Wood Pulp

Regular Number 50 Lb. Bdl.	FINISH 1	2	3	4	Weight per M Sq. Ft.
Quan.	Inch	Inch	Inch	Inch	Lbs.
40	.061	.058	.053	.049	180
45	.054	.052	.048	.043	160
50	.049	.047	.043	.039	144
55	.045	.043	.039	.035	131
60	.041	.039	.036	.032	120
65	.038	.036	.033	.030	111
70	.035	.033	.031	.028	103
75	.032	.031	.029	.026	96
80	.030	.029	.027	.024	90
85	.028	.027	.025	.023	85
90	.027	.025	.023	.021	80
95	.025	.024	.022	.020	76
100	.023	.022	.021	.019	72
110	.021	.020	.019	.017	65
120	.019	.018	.017	.015	60

No. 5 Gauge List—Pasted Solids News Board

Regular Number 50 Lb. Bdl.	FINISH Rough	Smooth	Weight per M Sq. Ft.
Quan.	Inch	Inch	Lbs.
10	.233	.196	720
15	.156	.130	480
20	.117	.098	360
25	.094	.078	288
30	.078	.065	240
35	.066	.056	206

No. 6 Gauge List and Ream Weight Table Patent Coated and Solid Manila Board

1. Patent Coated, Solid Manila Back.
2. Patent Coated, News Back.
3. Patent Coated, News Center, Manila Back.
4. Patent Coated, Chip Back.
5. Patent Coated, Blue or Color Back.
6. Solid Manila Board.

Caliper of Individual Sheets	WEIGHT PER 500 SHEETS 25 × 40 (1000 Sq. Ins.)	24 × 36 (864 Sq. Ins.)	28 × 24 (1232 Sq. Ins.)	Weight per M Sq. Ft.
Inch	Lbs.	Lbs.	Lbs.	Lbs.
.011	178	154	219	51
.012	194	168	239	56
.013	211	182	260	61
.014	219	189	270	63
.015	226	195	278	65
.016	241	208	297	69
.018	266	230	328	77
.020	284	245	350	82
.022	306	264	377	88
.024	333	288	410	96
.026	361	312	445	104
.028	389	336	479	112
.030	417	360	514	120
.032	444	384	547	128
.034	472	408	582	136
.040	556	480	685	160

Gauge lists published by courtesy of the National Paperboard Association.

XUM

Standards

Standard rules and regulations have been adopted by the National Paperboard Association, representing the manufacturers of folding and set-up boxboards.

The basic facts for establishing the standards, and other information, were obtained from investigations of practices in large and small boxboard mills scattered over a wide area. Following this survey, conferences were held by makers of board, fabricators of folding and set-up boxes, and consumer organizations, and there a series of standard gauge lists was evolved; also a set of definitions which met with general approval. These gauge lists are identical with Simplified Practice Recommendation R44-36, entitled Box Board Thicknesses (United States Department of Commerce; effective December 31, 1936). Gauge cuts are given in the insert chart. The set of definitions and the gauge lists are as follows:

Standard Sizes—In all grades, a sheet 25 in. by 40 in., containing 1,000 sq. in.

Patent-coated or manila boards (Lists 6 to 8) are also shown in sizes 24 in. by 36 in., containing 864 sq. in. and 28 in. by 44 in., containing 1,232 sq. in. The standard sizes are used as bases for all computations.

Standard package—In patent-coated or solid manila board, a ream of 500 sheets.

These grades are sometimes packed, for convenience, in fractions or multiples of a ream, depending upon the size of the sheet.

Bundle—A unit containing 50 lbs.

The quantity of sheets varies with the size and the caliper, but the weight of 50 lbs. of board is fixed.

Regular numbers—The quantity of standard sized sheets (25 by 40) of boxboard to make a bundle of 50 lbs.

Count—The quantity of odd-sized sheets required to make a bundle.

For the standard size (25 by 40) the count would be identical with the Regular Number; therefore it has become the custom to use the term Count to apply only to odd-sized sheets and Regular Number to standard size. The count for an odd-sized sheet is found by dividing the area of the corresponding Regular Number by the number of square inches in the odd-sized sheet.

Finish—Four standard finishes designated as Numbers 1 to 4, from lowest to highest.

The degree of finish is regulated by the pressure exerted on the calenders under which the board passes. The pressure determines the density of the sheet. The resulting surface is incidental, but it becomes smoother as calender pressure is increased.

No. 1—Light pressure results in a rough surface and low density. It gives large sheetage for its weight; i.e., greatest area to pound of board.

No. 2—Medium pressure—fair surface and sheetage. Popular for ordinary printing and general utility purposes.

No. 3—Heavy pressure—smooth surface and low sheetage. Used largely where better printing surface is required.

No. 4—Heaviest pressure—extra-smooth and slick surface, dense body and firm compact fibres. It has the lowest sheetage.

Rough—Smooth—where but two finishes are used, these relative terms designate light or heavy weight board in caliper points.

Dimensions—Width in inches given first, then length. Width is the measurement across the machine, i.e., space between knives in the slitter. Length is always the measurement in the direction of the grain, i.e., space between cut-offs.

Bending—Any board which, when properly scored and folded, shows no break in the outer fibres.

Gauge Lists

Gauge Lists 1 to 6 (printed in the insert chart), give in the first column the Regular Numbers or quantity of standard-sized sheets in a bundle weighing 50 pounds. The figures in the other columns give the caliper (decimals of an inch) when made with the finish indicated.

Thus Gauge List No. 1, first line, column 1, shows Regular Number 35, meaning 35 standard-sized sheets to the bundle. Column 2 gives the caliper of .065 in. as the thickness of No. 1 finish; column 3, .061 in. for No. 2 finish; and so on.

Gauge List 6 states the caliper in the first column, and to the right of it, the weight of a ream of 500 sheets. Three sizes of sheets are listed with the corresponding weights.

The weight per M Sq. Ft. is also shown on each list.

Special surfacings

Boxboard is taken from the paper machine either in rolls or in sheets, cut to specified size, and may be further processed to give a special type of surface. Where the equipment is so arranged, some of these operations may be continuous with the paper machine while others are treated in a separate division. Following is a description of some finishes:

Clay coated—Clay, with casein as an adhesive, is applied as a coating to boxboard and, with subsequent calendering, produces an excellent color and brightness. It is the highest standard grade of board and is used largely for the better quality of folding cartons.

Grained—An imitation oak, leather, marble, or other finish may be given to a boxboard by passing it through printing cylinders appropriately engraved.

Lined or Pasted—Any boxboard may be pasted to another or lined with a plain or fancy cover paper, parchment, glassine, or other material, either in the roll or in sheet form. Asphalt, properly prepared, or other adhesives, may be used to make the board practically waterproof. Pasted board may be built up to any desired thickness and made to serve a number of uses.

Table 2 shows general types of boxes (column headings) and the grades of board (at the left) from which they may be made. Such a statement is necessarily based upon averages, since styles of boxes vary the same as styles in clothing, and poorer or better grades may be supplied to meet the desire of the buyer.

XUM

Folding & display cartons

The most notable characteristic of the folding carton or folding paper box is its infinite variety. Literally hundreds of variations in style and construction have been developed to meet the merchandising needs of the great assortment of products packaged in these containers. However, the 48 illustrations in this section cover all the important styles. Because of patent restrictions not all of these can be manufactured by any one company. Patented cartons have been so designated, and information on the patent for any given box can be procured from the regular box manufacturers.

In addition to styles in construction, other factors offer the user of cartons a wide choice. Board, for example, comes in a variety of grades, colors and thicknesses, as described elsewhere in this catalog. The carton may be printed in a number of colors by either letterpress or lithography. Special treatments either of the board or of the printed carton may give it specially desired characteristics. Varnish, lacquer, paraffin or cellulose film may be applied or the board may be embossed. The manufacturer of cartons is in a position to explain these processes and advantages in all details and to recommend desirable decorations.

Specification data

Purchasers can avoid much trouble by giving complete information at the earliest opportunity. The following points should be specified:

a. Stock: Description of type of board to be utilized
b. Caliper or thickness of the board
c. Dimensions: This, of course, is of vital importance. The proper method is explained under "Basic Styles" below
d. Engravings (whether furnished by purchaser, on hand, or to be made and billed as an extra charge)
e. Colors: Specific naming of colors, preferably by some one of the standard systems, with mention of any peculiarities in use, such as fastness to sunlight or exposure to alkalies
f. Printing (whether letterpress or lithography)
g. Copy and proofs (including opportunity to check them before final printing)
h. Surface protection (i.e., varnishing, lacquering)
i. Packing and method of marking container to facilitate inventory and factory re-use
j. Delivery or shipping instructions

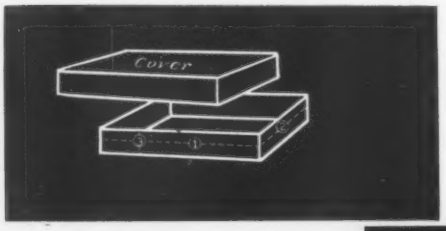
Basic styles

All folding boxes are derived from three basic types as illustrated below; the numbers on each diagram show the proper method and order of specifying dimensions. This method is recommended by the Folding Paper Box Association of America. All measurements should be from center of crease to center of crease.

Each of the illustrations on the following pages comprises two panels. At the right is the photograph of a completed carton, exactly as it would appear in use. At the left is a photo-diagram of the same carton, flat and unprinted, showing its construction and proportions. The solid lines indicate lines for scoring edges; dotted lines indicate perforations or scores intended for tearing or opening of the container; cross hatching indicates glued seams. All diagrams are photographed against a one-inch scale which forms the squares appearing as backgrounds for the cartons.

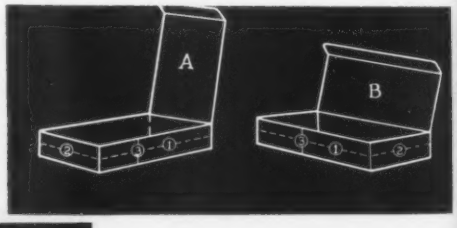
The various styles are arranged under the three classes described above. In addition, there are illustrated some two-piece boxes, each of a different basic type; several styles of carriers for bottled beverages; and a number of display stands.

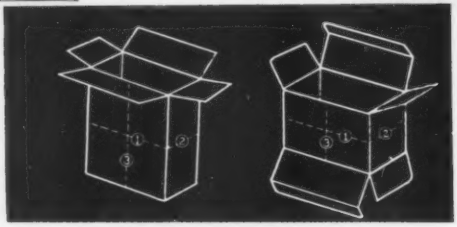
Some of the styles may be out for the duration—but they will be back!



The tray carton (above): A container, open on one plane, formed by folding up a sheet of board to make side panels. Corners are then glued or locked in place. Most two-piece boxes are two trays which are fitted together.

The end - opening carton (below): Basically a tube with one or both ends folded and sealed, or locked or tucked to form the carton closure.





The top-opening carton (above): This type is similar to the tray except that one of the side panels is extended and folded to cover the open plane. This carton may be tucked, or it may be locked or glued to form the closure.

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Class A: End Opening

1. SEAL-END CARTON. The most popular style carton for packing flour, cereals, sugar, salt, teas, coffees, spices, soap powders and a wide variety of products. Readily packed on high-speed automatic machinery but difficult to seal by hand.

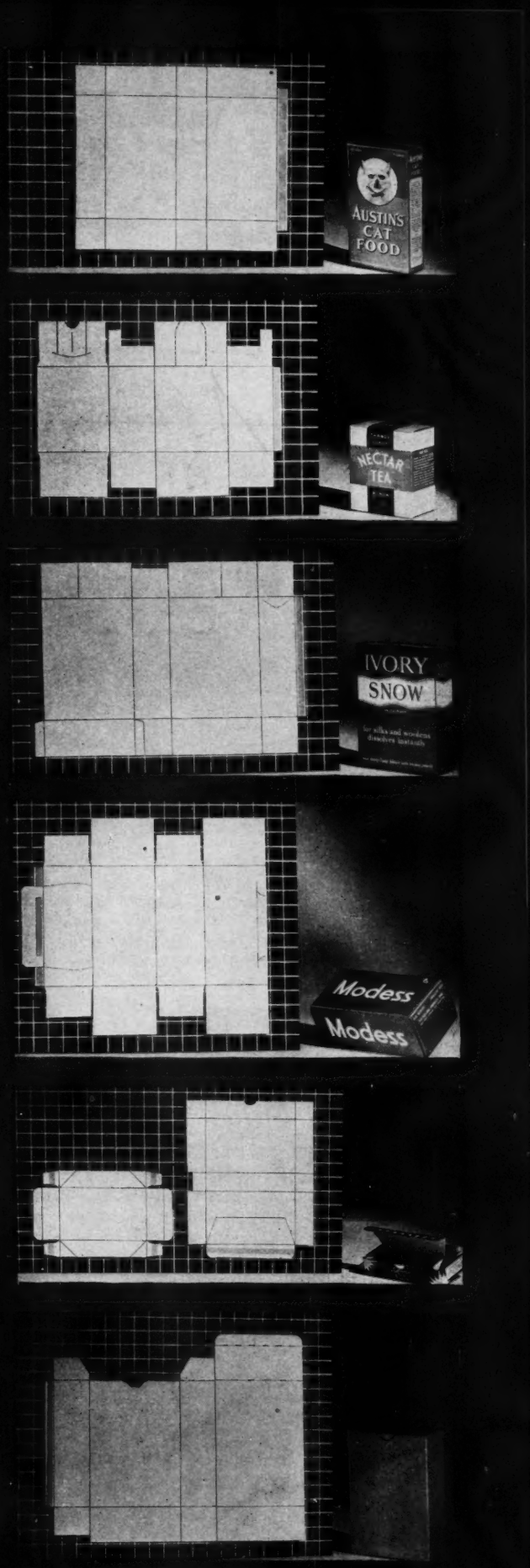
2. SEAL-END CARTON WITH POURING SPOUT. Seal-end carton, same construction as No. 1 with the additional feature of the patented pouring spout. This pouring spout makes it possible to dispense contents easily without spilling and affords a means of re-closing.

3. SEAL-END CARTON for automatic packing and sealing. It is similar to No. 1 except that it has incorporated in its construction additional flaps on the bottom of the carton to prevent sifting. This carton is particularly suited for products which are milled or pulverized to such a degree that particles would sift through the regular seal-end carton. This carton also has a unique pouring spout, which is formed by breaking the perforations in the top of the side panel. Patented.

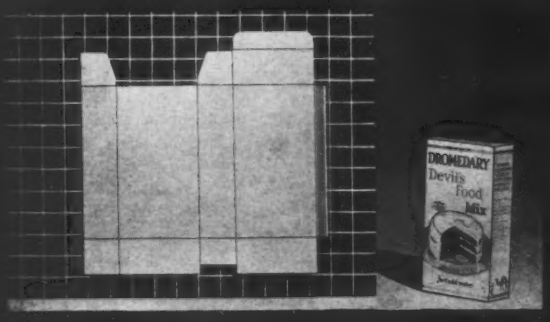
4. SEAL-END BROADSIDE OPENER STYLE. An interesting development in a seal-end carton which permits inexpensive, automatic filling through the ends of the carton which are later securely sealed. Carton is opened on the broad side, hence the name "Broadside Opener." Patented.

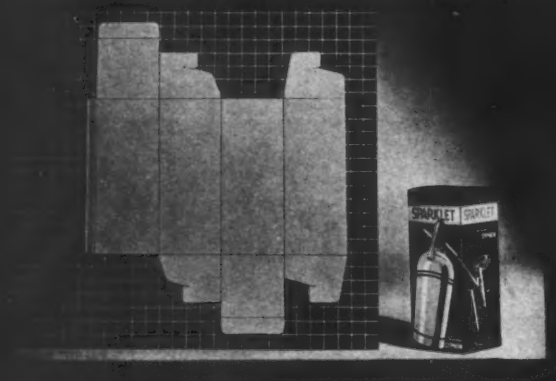
5. TWO-PIECE BROADSIDE OPENER. This is a variation of style No. 4 and is primarily used for the packaging of small pieces such as cube sugar. The individual pieces are first packed into the tray which is then easily inserted through the end of the outer carton. The outer carton is sealed automatically. The consumer can readily open the carton by breaking the spotted glue seam and tearing perforations. The container can be re-closed by the consumer by treating the hinged opening as an ordinary tuck flap. Patented.

6. TUCK-TOP, SEAL-BOTTOM SHELL WITH TIGHT WRAP. Consists of a plain shell, often made of chip board, completely covered by a printed wrapper. Widely used for cereals and crackers. Requires automatic machine equipment. Outer wrapper prevents sifting, air deterioration and contamination from insects or dust. Newest development is to paraffin the printed side of wrap to give added protection to product. Wrap may be glued solidly to all six surfaces of the carton or "spot glued" at certain points.



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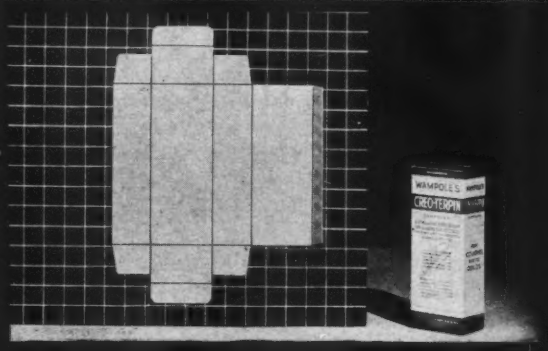
7. TUCK-TOP, SEAL-BOTTOM CARTON. Has the advantage of a solidly sealed bottom and convenience of the easily opened and closed tuck top, for ready accessibility to contents. Best suited to automatic packing because of difficulty of sealing bottom by hand. Note essential similarity to No. 6 with the exception of the use of printing directly on the carton blank.

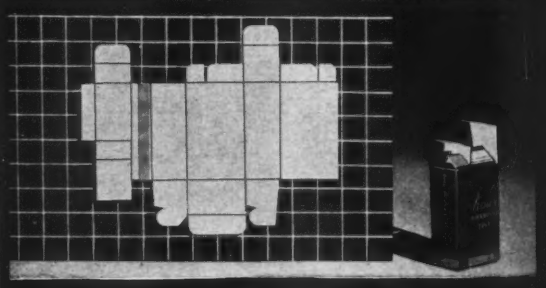
8. REVERSE-TUCK CARTON. The most widely used of all carton styles for low-priced articles of all kinds. Easily set up by hand and adaptable to automatic packing. Convenient to open and close and exceedingly economical in manufacture because cartons interlock. This style not suited for heavy products, which must be held securely in the carton and require some positive means of locking the end tucks, or for powdery products, such as flour, salt and sugar, which are likely to sift through and thus require a seal-end carton. Ready accessibility and low cost make this style carton ideal for five- and ten-cent units of candy, such as cough drops, as well as shaving creams and tooth paste in tubes. Type illustrated has special locking side flaps known as "Arthur Locks".

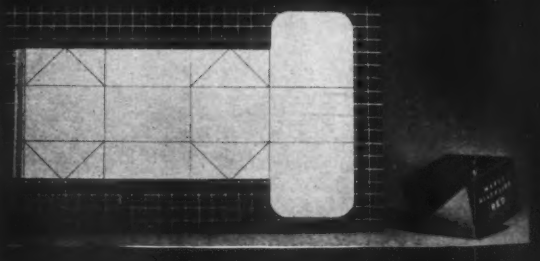
9. STRAIGHT-TUCK CARTON. This carton has no advantage over reverse-tuck carton, but is required and extensively used with high-speed automatic cartoning machines. Must be made with right and left glue seams to secure economy of interlocking for economical manufacturing. Serves as an effective and satisfactory low-price package for the same large variety of products using the regular reverse-tuck carton. When used for products packaged in glass bottles, it is advisable to equip the bottom flaps with a positive locking device to insure against the possibility of the bottle falling out of the carton. Inserts or corrugated liner may be used for added protection of the product.

10. STRAIGHT-TUCK CARTON, "2 in 1" STYLE. Patented carton made with an inside divider which, when folded into position, forms two separate compartments. Made in one piece, delivered in conventional knocked-down form. An ideal carton for a combination sale, such as a shampoo and a hair tint, or a bottle with medicine dropper or dispensing unit.

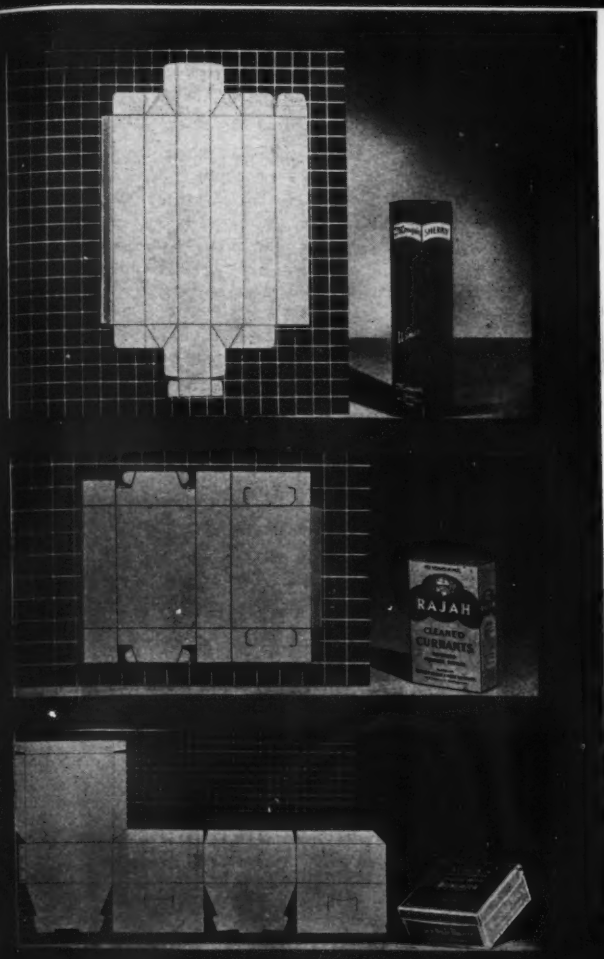
11. BELLOWS-END CARTON. Web-end construction forms a strong and tight end closure by hand assembly. Carton may be opened and tightly reclosed at will. Note simplicity of construction. Web-end construction provides substantial protection against sifting when granular or crumbling products are packed in this type of carton.







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12. HEXAGONAL CARTON: TUCK TOP AND LOCK BOTTOM. A patented carton that combines novelty with ease and speed of setting up. Quick-closing top requires only a single tuck or flap, while the Hibson lock bottom insures a permanent seal. Capable of holding the weight of a comparatively heavy inner package, such as a bottle of wine, liqueur or any other product packed in glass. Types of this sort are extensively used for display purposes and for seasonal promotion of products ordinarily merchandised in their glass containers alone.

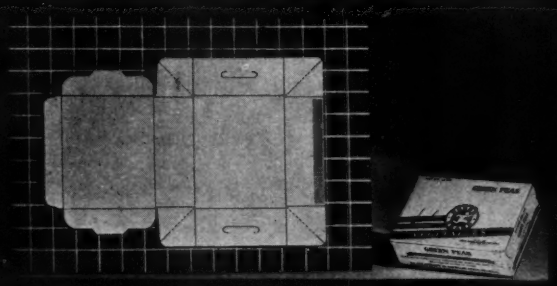
13. GREENLEAF LOCK CARTON. Locks at each end securely. Widely used for packing dried fruits and other heavy bulky products. Also serves as a packer or carrier unit for a number of individual cartons. Locks of this type provide sufficient strength to support a comparatively great inner package weight, yet are so constructed as to permit of fairly frequent opening and re-closing by the consumer.

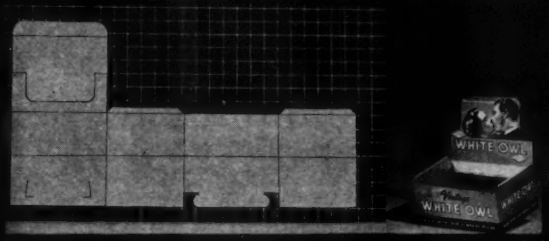
14. QUIKLOC STYLE CRACKER CADDY. Originally a caddy was a container for bulk goods which were dispensed in small units. Illustration shows one holding several pounds of crackers which is bought by many consumers. One-piece collapsible construction with patented bottom which is quickly set up. Two corners of cover require metal stitching by user. Note how the construction of the bottom flaps provides a multi-layer bottom when the caddy is erected.

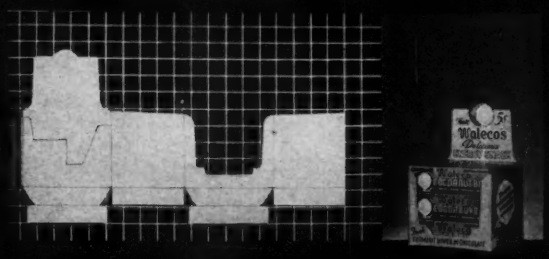
15. ONE-PIECE WEB ENDS AND SNAP LOCKS. This carton, delivered in glue tube fashion, is easily and quickly assembled. The carton shown was primarily developed for frosted foods, which require tight end closures and ease and speed in packing. It is well suited for various other types of products which require features mentioned above plus economy. Patented.

16. PANEL-FOLD DISPLAY CONTAINER WITH LOCK BOTTOM. Simple in construction and setting up. Cover is so arranged as to make an attractive display panel. Protective cover is optional. Stands flat on the counter and provides good visibility to the displayed items. Requires printing and coating on only one side of the board.

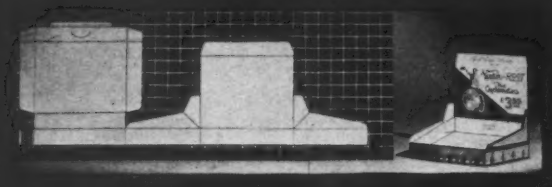
17. BROOKS TWIN DISPLAY CONTAINER. This container is a lock bottom low front, with a pivoting swing display card. The display card is designed to give the effect of printing on two sides. This effect is gained by twisting the card 180 deg. when display is set up.



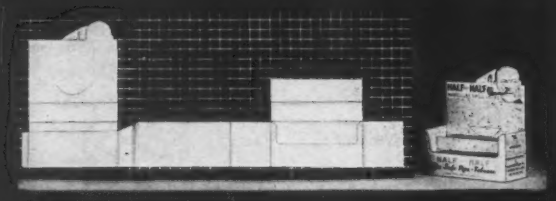




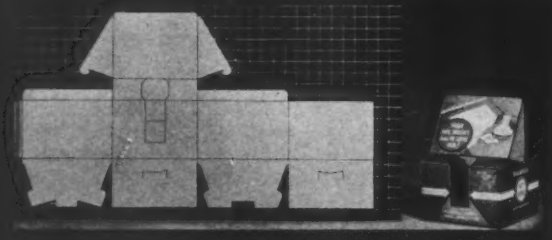
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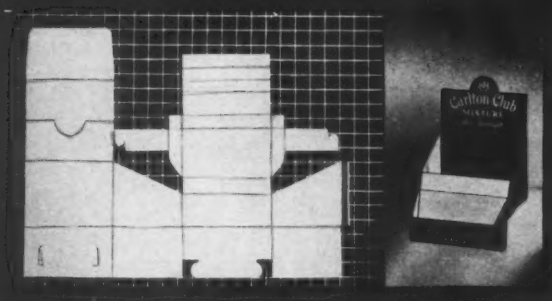
18. BROOKS TILTING DISPLAY CONTAINER. This style is equipped with a rear tab which the dealer elevates and secures in the rear panel, effectively displaying the merchandise at a desirable angle. This tab may be seen as indicated in the diagram-photo, upper left-hand corner. This is a patented display container type of construction.



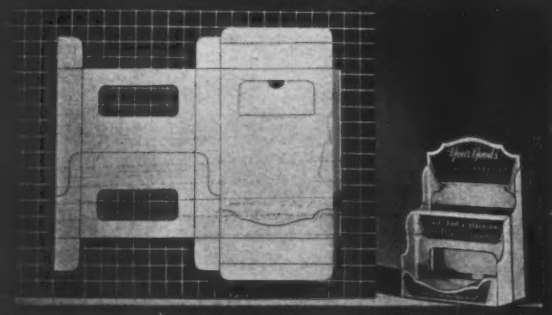
19. TWO-STEP DISPLAY CONTAINER. Patented display which shows products in two steps or tiers. Made in one piece, shipped flat. Easily set up by pushing down on two upright pieces which are scored to form the steps. Requires protective sleeve for shipping filled with merchandise. A simple, attractive display unit of sturdy construction and good counter stability.



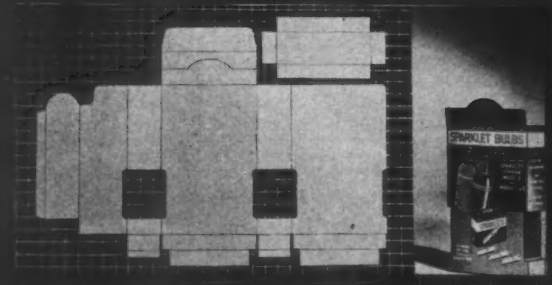
20. COUNTER DISPLAY DISPENSER. A novel container in which the display panel, customarily placed at the back, is placed somewhat forward, so that only a few of the articles are displayed, the greater number being behind the display panel, from which position they are dispensed. Avoids disorderly appearance of partly filled displays after a few units are sold. This device is unsuitable where mass display is the desired merchandising method.



21. FRONT-PANEL, LOCK-BOTTOM DISPLAY CONTAINER WITH POCKET. An ingenious display by which contents are sold from the stock packed in the main portion of the container, while the pocket front permits an effective continuous display of the actual article. Prevents unsightly gaps in the display line, which is a weakness in many display containers. Note how the pocket front hangs below counter level or level of step on which main portion of display rests.



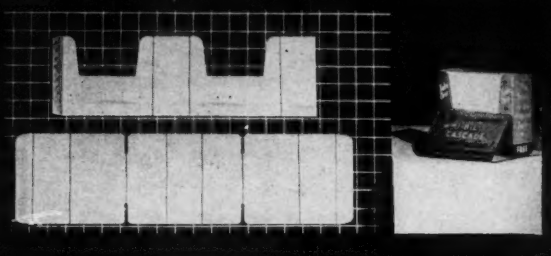
22. SKYSCRAPER (BROKEN BACK) DISPLAY CONTAINER. Patented container for displaying products in two tiers in an upright or "skyscraper" manner. Made with easel to hold second tier in raised position. Scored in center so that for shipping it folds up, but is readily set up for display by the dealer. When folded for shipping, the two halves of the unit so interlock as to form one flat, rectangular carton with all merchandise protected on all sides.



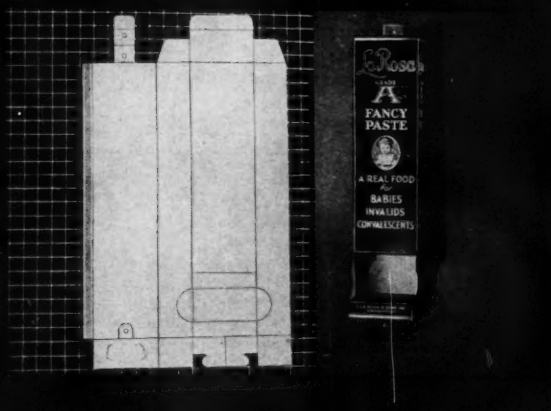
23. CENTER-DIVIDER DISPLAY DISPENSER. A straight tuck end carton with center divider forming two compartments. Readily filled, products falling into position with removal of bottom one. Stands erect on counter or may be hung on wall. Center divider construction a patented feature. Important considerations in planning dispensers of this type are: (a) provision of ample opening for withdrawal and (b) provision against "jamming" of product in reservoir tower. Both are easily provided for with a bit of foresight.

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24. FREE PAMPHLET DISPENSER. This construction is easily set up on the dealer's counter ready to serve as a dispenser of pamphlets, advertising media or similar material. Its two-piece construction, simple and unique, is extremely inexpensive, and provides an economical means of shipping and distributing free literature. Note that the unit faces both ways—permitting use on island counters.

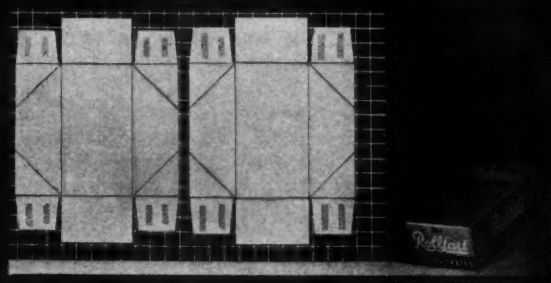


25. HANGER DISPENSER. This high, narrow dispenser holds a single row of packages, piled one on top of another, with an opening at the bottom through which they are easily withdrawn. Occupies minimum space on crowded drug store counters or may be hung on the wall or other available space. Note top and bottom hanger tabs, provided as an integral portion of the display carton blank.

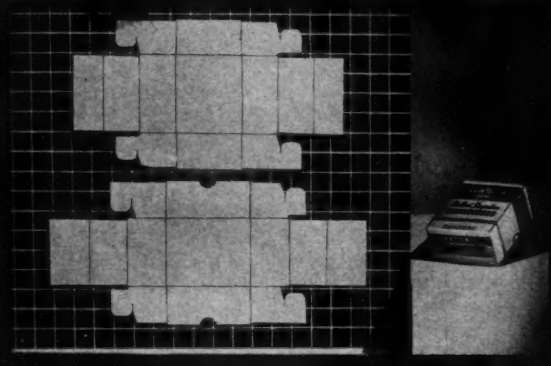


Class B: Tray

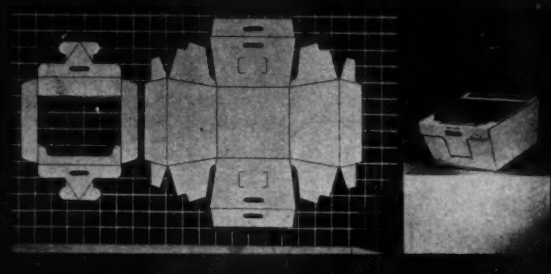
26. TWO-PIECE FULL TELESCOPE CARTON. These cartons are glued in collapsible form by carton manufacturer and shipped to user in that manner. Quickly set up by infolding to an upright position. Note that top half of container is slightly larger in all dimensions than lower or bottom half. This permits of telescoping without distortion of the container. Size, in such instances, must be accurately controlled to provide a tight—but not too tight—fit.

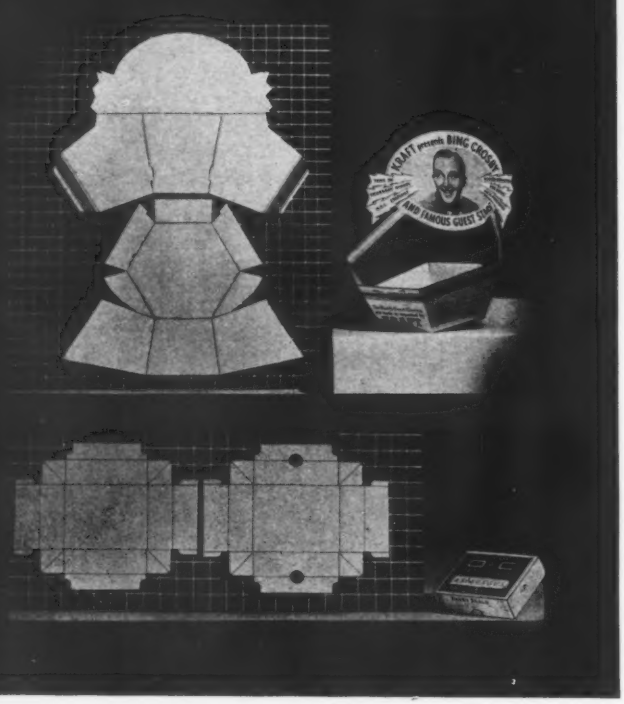


27. TWO-PIECE TELESCOPE CARTON WITH OVERLAPPING ENDS. This style carton assembled and folded by hand. Ends overlap and are held against the side by friction, but may be glued for additional reinforcement. A development of the overlapping end carton is an extra length tab provided as an additional protection on the top and bottom. A similar reinforcement along the sides can be provided for strength.



28. BERRY AND VEGETABLE CARTON. This type of carton has proved its adaptability to replace the ordinary wooden basket used for berries, small fruits and vegetables. Overlapping sides are wire stitched to set in proper position for use. Raised bottom and slotted sides insure proper ventilation for contents. Can be equipped with transparent window cover with locks to hold it secure. Patented.





29. BASKET DISPLAY CONTAINER. The display panel has been creased so that it can be folded to fit a shipping case. This does not interfere with the rigidity of the panel when on display as the panel is then forced into a curved position.

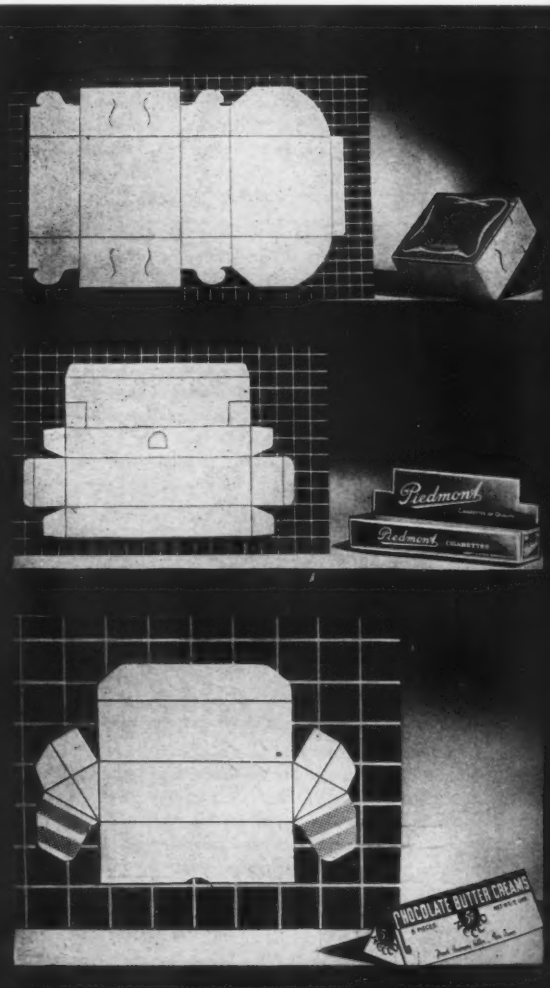
30. TWO-PIECE SIMPLEX STYLE CARTON. A carton construction which is rigid, easily set up and free of locks or tabs on the exterior surfaces. The web corner construction prevents leakage when packing frosted foods. This style is also adaptable for shoes, textiles and other types of products requiring a two-piece carton. This is a patented type.

Class C: Top Opening

31. ONE-PIECE CARTON WITH FOUR HOOK CATCHES. Economical for use in local bakeries where small quantities of several sizes are required. Two catches on each end hold the carton upright. This style is not sufficiently durable to stand long distance transportation or rough handling, but is used by bakeries for packaging cake sold in their own retail stores and carried home by consumers. Also used on routes for delivery-trucks-to-consumer purchases in which case it is frequently made with a window of transparent cellulose.

32. ONE-PIECE BRIGHTWOOD STYLE CARTON. A widely used one-piece carton for large-scale production. Automatically formed, glued along the vertical panels, filled and sealed by Brightwood machines in the package user's plant. Definite economies in packaging can be effected by the use of this style carton if sufficient production is regularly handled to justify the use of this automatic equipment.

33. TRIANGULAR CARTON. This carton is received in a glued knock-down form. It is easily assembled for filling by pushing the ends inwardly. After filling, the carton is closed by tucking in the top panel. Its novel shape adds display value to the individual carton. Note score lines on side walls. The folding of these walls permits shipment of the pre-glued carton in the flat.

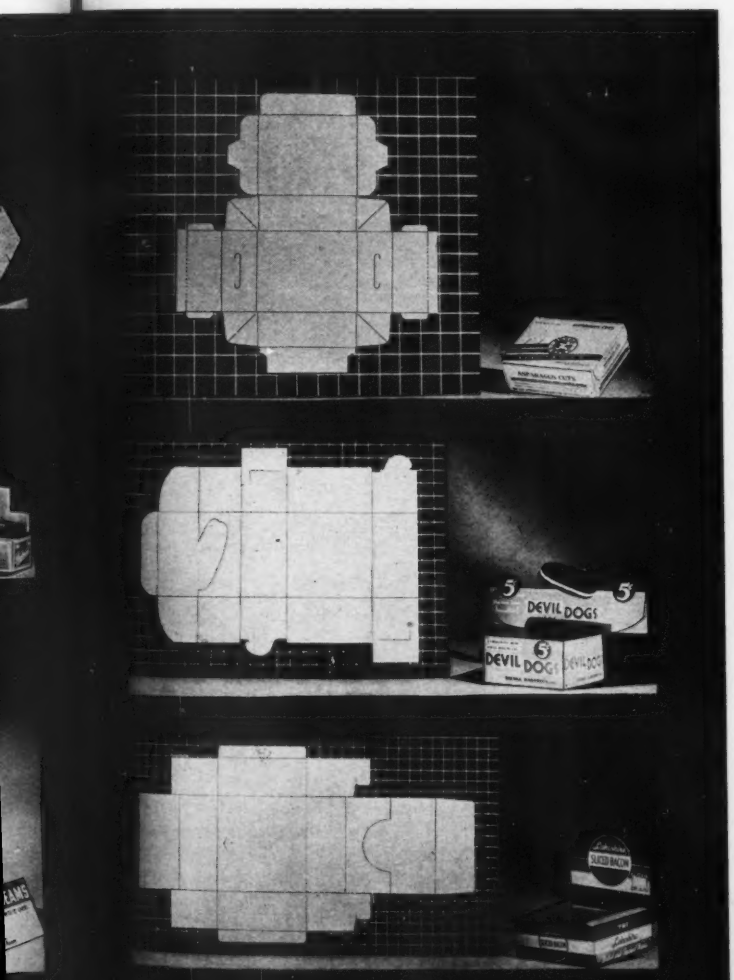


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34. *ONE-PIECE COLLAPSIBLE CARTON. A simple one-piece container serving as a carrier especially useful for bakery goods, cigarettes and many other products where quick set-up and low cost are factors. Shipped to user in knocked-down form, so that it occupies a minimum of storage space. Note cross hatched indications for glued seams. These tabs adhere to the outer ends of the bottom-most tabs. The intervening wall forming the bottom of the container is scored to fold in half, lengthwise, when shipped. This is snapped into erect position and made rigid by turning up tabs on side walls.*

35. *ONE-PIECE COLLAPSIBLE CARTON. Quickly set-up carton, made with tongues on cover which tuck into slots on the sides, making this style especially well suited for baked goods and similar products. Transparent cellulose window allows view of product without opening carton, which is most important to keep food products fresh and avoid spoilage from exposure to dust, dirt, flies or frequent handling before sale. Sometimes used with an inner band or liner, placed around a cake, the carton being made sufficiently high to prevent contact of cover with frosting.*



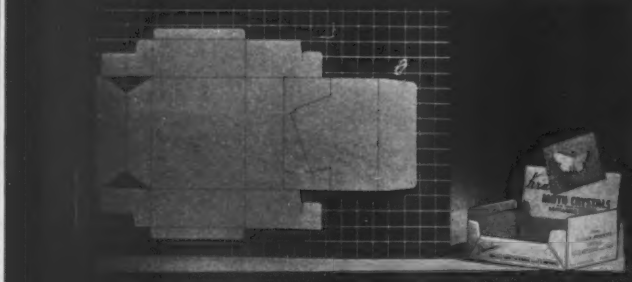


36. *ONE-PIECE SIMPLEX STYLE CARTON. Combines rigidity, finish and strength of set-up box and economy in cost, shipping and storage of a carton. Quickly set up without machinery. Made in all sizes from small candy boxes to large containers for blankets. One-side printing. Made with or without display lids and slip-over covers. No raw cut edges or outside locks mar the outside printed surfaces or finished appearance of the carton. Patented.*

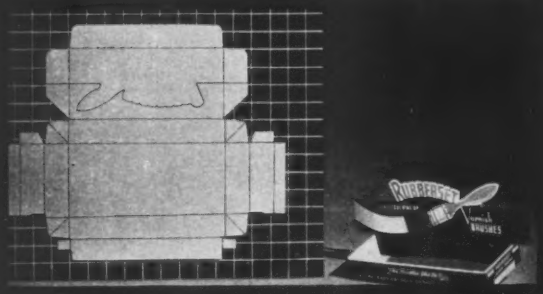
37. *ONE-PIECE CARTON WITH TWO HOOK CATCHES. An economical carton for local bakery use, where small quantities of several sizes are required. A catch lock on each end holds the carton upright. This style is not sufficiently durable to stand long distance transportation or rough handling, but is used by bakeries for packaging cakes sold in their own retail stores and carried home by consumers. Also made with transparent window.*

38. *ONE-PIECE OVERLAPPING FRONT—LOCK BACK PANEL, FOLD COVER. Economical to manufacture and extensively used for display purposes, this box has the added strength of the overlapping front which is not provided in the straight front box. The box can be made with panel-fold style display top, making possible printing on one side only.*

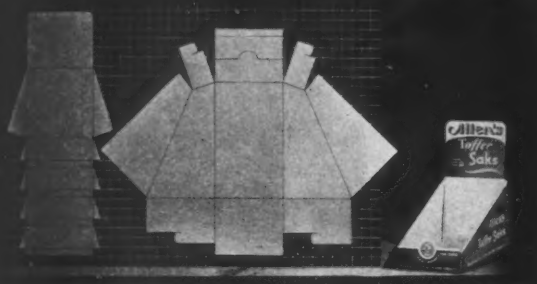
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39. ONE-PIECE OVERLAPPING LOW FRONT DISPLAY CONTAINER. Similar to No. 38 except front is cut down to show face panel of articles when they are packed in an upright position. The tuck flap at the top of the container should be made long enough to provide full protection for the packaged contents at the front corner, where the low wall of the display container offers a relatively weak point.

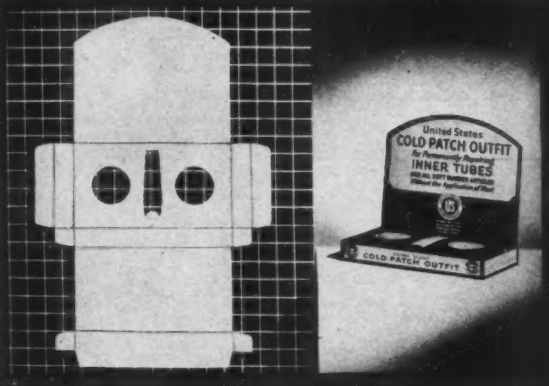


40. ONE-PIECE SIMPLEX CARTON DISPLAY. An efficient container and display unit. Die-cut cover offers excellent advertising display. Easily set up and free of locks on the exterior surfaces. Its most popular use is for one-dozen units such as paper wrapped toilet soaps, automotive or hardware items. Does not require protective sleeve as cover closes with front and side tucks. The side tucks, furthermore, increase the size of the display panel itself.

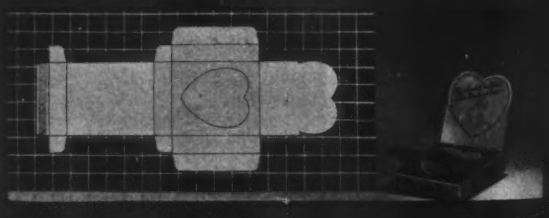


41. RHOMBOID DISPLAY CONTAINER. An effective new type of display container in which the individual packages are displayed in a staggered manner. Particularly useful for fragile items packed in glassine or transparent cellulose bags. Keeps packages in neat position while on display. This is a patented type of display container construction.

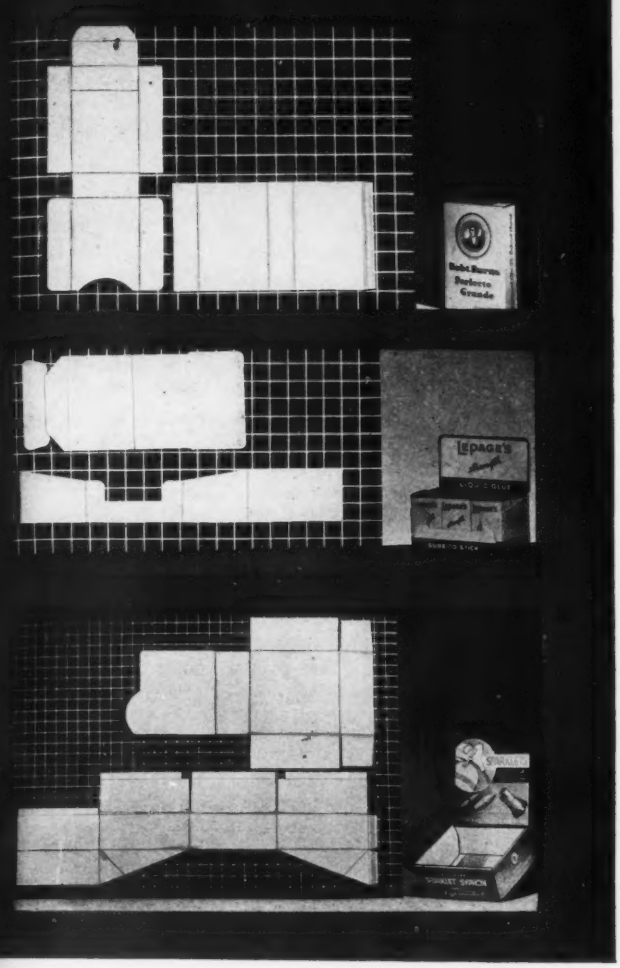
42. FIVE-PANEL COUNTER DISPLAY CONTAINER. This style has replaced the old type of five-panel carton which requires printing two sides and coating two sides, primarily used for introduction and sampling of new products. To set up this display, it is only necessary to insert the end tucks. Note that the four lower panels (in diagram) form a carton in themselves, the fifth panel, or tail, forming the display background.



43. FIVE-PANEL COUNTER DISPLAY. Same general style as No. 42 except that it has been made to serve as a display shipper and carry-home unit. As a carry-unit the display panel folds down over the die-cut carton face to provide an effective closure. If desired, this panel could be so designed as to incorporate locking tabs for added strength.



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AB: Combination

44. TUBE AND SLIDE. Consists of a folding inner portion, variously contrived, to be inserted in a tube on which the design is printed. Access to the contents is easy and quick. It offers adequate protection for a wide variety of products, such as cigar packs holding five or ten popularly priced cigars. When this style is made with an inner tray it is well suited for pills and capsules which may be carried in the consumer's pocket.

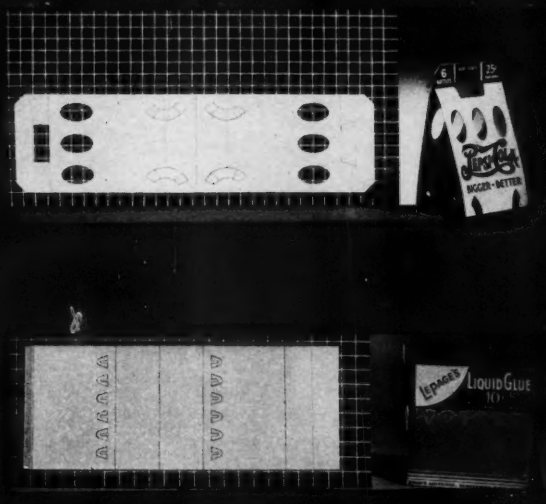
45. BROOKS TWIN DISPLAY CONTAINER. A patented twin display container, the two sections nesting into each other, giving the dealer two distinctive counter displays. This unit of two containers requires a protective sleeve for shipping. It is economical and easy to set up by the packer and the retailer.

46. SIMPLEX DISPLAY CONTAINER. A special easel permits tilting this container at different angles, for effective display. Requires printing and coating one side only. Protective sleeve necessary for shipping. Principal feature is the simplicity with which the dealer may display the goods at an angle. Display panel is equipped with supporting flap which enables advantageous showing of the advertising message.

Carriers and Dispensers

47. THREE-BOTTLE CARRIER and DISPLAY. This carrier has the feature of being an effective display and carry-home carton combined. It requires printing two sides; however, printing is only required on the inside for the display feature. For economy, therefore, the outside printing could be eliminated. Patent applied for.

48. MULTIPLE UNIT DISPLAY CARD. This economical display card holds twelve tubes suspended from die-cut tabs. Six units are on display with a reserve stock of six tubes on the back panel. The design repeats so that display can be reversed when front half of goods is sold. This card requires no separate easel but can be folded to ship flat.



Waxed cartons

by Owen E. Lyons

War developments highlighted the value of cartons made of wax-coated or wax-saturated paperboard in providing resistance against loss of moisture from inside the carton, or penetration of moisture from the outside. Certain packaged food products such as ice cream, butter, lard, oleo, shortening, cheese and frozen foods are shipped and stored under full or partial refrigeration. Upon removal from refrigerated temperatures to room temperatures, moisture droplets gather on the surfaces of the carton. Wax treatment provides resistance to this moisture and enables the carton to retain its strength and shape en route to the consumer's kitchen.

Types of paraffin application

There are two principal methods of applying wax: the high-gloss or cold-water method, which leaves a coating of wax on the surfaces of the carton; and the saturation or impregnation method which drives the wax into the fibres of the board, leaving the surfaces comparatively dry and uncoated. A third and less common manner of treatment is "dull paraffin," by means of which a very light coating of non-glossy wax is laid on the surfaces.

Another method, now common for military packaging, is the wax dipping system of protecting the outside.

Some time ago, firms wishing to guard the contents of frozen food packages from dehydration—at the same time doing away with the customary cellophane or paper liner—developed a method of dipping the folded and closed ends of the packages in a special wax bath. The only possible place where the carton would be subject to dehydration—the sides and body being made of waxed paper originally—was at the ends where the carton folds were made. The wax treatment completely covered the ends. Special waxes were used to provide a covering that would be fairly flexible and would not become brittle or flake off when it hardened or was subjected to temperature changes.

The large quantities of food and other supplies for the armed forces are now almost universally given the wax-dip treatment. The difference is that these military packages are completely dipped, covering the entire surfaces with a heavy and protective wax coating. Packages so protected will stand up perfectly under widely differing temperatures and humidities. When food or other goods are packaged for military uses, there is no certainty as to where the package may eventually be shipped—to a far northern outpost or a tropical port.

Sequence of manufacturing operations

The basis of manufacturing paraffined cartons is the printing and die-cutting of the carton so that its printed design and all the board used in its construction are available in one unit, properly printed, scored and cut. Production of commercial quantities of cartons is handled in combination runs—same number of cartons per sheet. The combination may include cartons of but one design, or it may be made up of various sizes, colors, designs and construction combined to run efficiently together. Manufacturing procedure follows this sequence: printing, die-cutting and scoring, paraffining and gluing.

Printing and waxing

The merchandising advantages of well-printed designs and colors are available to buyers of paraffined cartons. Paperboard manufacturers provide a well-bleached outer surface that is excellent for modern printing processes. A semi-bleached or unbleached inside surface is usually specified for cartons that carry food not directly in contact with the inner surface—butter and lard, for example. Linerless ice cream cartons are factory-filled, with the ice cream directly in contact with the inner surface. A solid-bleached sulphite board is standard for this carton.

The inside surface of a linerless ice cream carton is treated with a special, high-gloss, hard-surface wax to insure against weakness of the surface next to the product. The outside surface is treated with a lighter, eggshell wax coating which affords adequate protection

1. Waxed cartons for frozen foods can be given a variety of decorative treatments. These packages are wrapped in paper printed with designs which are registered on it by means of an electric eye. Photo Battle Creek Bread Wrapping Machine Co.



against attack by moisture from the outside. Varying weights of wax, and varying compositions, may be applied to attain specific protective properties.

Considerable progress has also been made in paraffining. In addition to a store of technical knowledge concerning waxes, wax combinations and properties of waxes, the industry has greatly advanced the technique of applying wax. Flexibility and accuracy of application has greatly improved.

Gluing of paraffined cartons

The gluing operation follows the printing, die-cutting and waxing of high-gloss waxed cartons. Special gluing machines remove the wax from the surfaces to be glued, a glue wheel spots the adhesive at the proper points, and the folding and setting of the glued surfaces is then done by the gluing machine. Glues derived from vegetable sources are standard specifications for food-containers.

The gluing of saturated or impregnated cartons also follows printing and cutting. Because of the comparatively dry surfaces of impregnated cartons, gluing is easily handled.

For extra charge (an extra machine operation), the paraffined cartons used for ice cream can be furnished with a de-waxed strip on which flavors may be stamped.

Construction and sizes

Paraffined cartons for foods, in contrast to unparaffined cartons for miscellaneous uses, are well standardized in construction and in size. This is especially true of packages for ice cream, units of which have been standardized in pints, quarts and multiples thereof. Packaging of ice cream is either a semi-automatic or a manual operation, and this has a bearing on standardization of construction.

Likewise, cartons for butter, lard, oleo, shortening and cheese have a constant unit of sale—the pound or multiples of the pound—which limits their variation in size. Some leeway is required in the construction of cartons because of slight variations in the automatic machinery available for packing these products.

Frozen food packaging

The newest branch of the food business to become a sizable purchaser of paraffined cartons is the frozen food industry. Because frozen foods require extraordinary protection against dehydration, a number of packages intended to assure that protection have been used by the industry. Many have proved unsatisfactory.

Foods have long been frozen in bulk containers for such wholesale users as hotels and bakeries. More recently a far wider demand has developed for the retail consumer units, distributed by means of refrigerated display cases. Latest development in this field is home freezing, for which freezing units and packages are avail-

2



2. Waxed cartons with inner liners of vegetable parchment preserve sensitive foods. Photo Menashs Products Co.

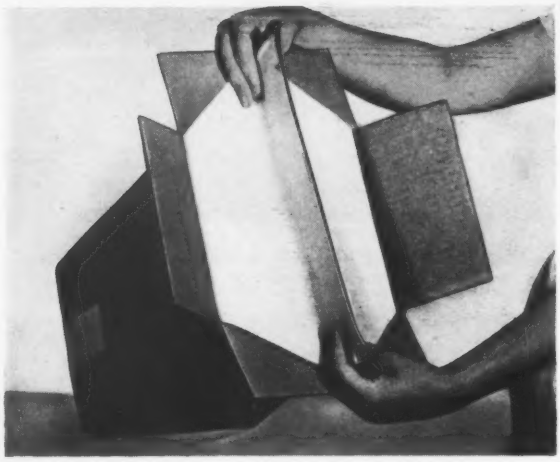
3



4



3. Home freezing can be made easy by using a curling iron to heat seal a waxed carton of the bag-in-box type. Photo Interstate Folding Box Co. 4. Quick-frozen foods have been packaged here in paraffin-treated cartons of various consumer-unit sizes. Photo Sutherland Paper Co.



5. Wax-coated container for bulk packaging frozen foods has a heat-sealed inner bag. Photo Menasha Products Co.

able in sizes and quantities to permit the housewife to preserve the fruits of her victory garden, using her curling iron or flat-iron to seal the package. Whether or not this has come to stay is yet to be seen.*

Regardless of size of package or scale of operations—bulk packages, commercial consumer units, or home-freeze, all branches of this activity have one major problem in common—that of protection against the loss of moisturevapor which causes freezer burn and desiccation of package contents.

The sub-zero and near-zero temperatures in which foods are frozen and stored are extremely dry. Seeking to absorb moisture from every source, the dry air "blots up" moisture and exerts a constant "pull" on any object having moisture content. The air takes up moisture in the form of moisturevapor, an invisible gas which readily penetrates ordinary papers and packages. The frost which coats the pipes of a cold storage or refrigerator is a condensation of this very elusive and highly mobile moisturevapor.

* See MODERN PACKAGING, December 1943, "Frozen Victory Gardens."

6. Waxed ice-cream cartons may be machine packed or filled at the retail counter. Photo Menasha Products Co.



A striking demonstration of this air attack can be arranged by placing an uncovered cake of ice in a locker storage room. Little by little the ice will disappear. It will not "melt"; it will not leave the pool of water you would expect to see when ice melts in high temperatures. The cake of ice will grow smaller and smaller and eventually it will disappear without a trace. Its moisturevapor will then have been entirely absorbed by the dry air.

This is the exact physical action against which frozen foods must be protected. This is the damaging condition which makes it absolutely necessary that frozen foods in storage be covered by packaging materials which insulate them against this action. Because their moisture is air-absorbed in the form of moisturevapor, foods change in appearance, in taste and in nutritive value. This change may run from a few white, dry surface spots, commonly called "freezer burns," to almost complete desiccation. Their taste will then vary from an occasional tough or fibrous spot to a straw-like, completely flavorless lump.

For the most satisfactory freezing, the complete content of the package should be frozen as thoroughly as possible. Because of an odd shape, certain packages do not permit penetration of the freezing temperature to the entire content. Thus a center section of certain packages may be only partially frozen. Experience proves that a package which allows more inch area exposed to the cold temperatures freezes faster and holds the freeze better than a package with less exposed area.

Not all packaging materials can withstand the damaging attack of the cold and extremely low humidity. Certain wrapping materials may develop a tendency to dry out, to become brittle and to break when exposed to these conditions. Certain coatings applied to papers as a layer of moistureproofness or for heat-sealing purposes may crystallize and break after exposure to storage temperatures and humidity. This breaks the continuous moisturevapor protection afforded the contents of the package and even break provides an opening for a loss of moisture.

A point which hasn't been stressed much in previous discussions of frozen food packaging is the range of temperatures which certain products must have. Some vegetables, for example, are pre-cooked or blanched before freezing. From a temperature above boiling point, they are placed in a package at room temperature. Then they are exposed to a sub-zero temperature for quick freezing and finally they are stored for an indefinite period at a locker freezer or home freezer temperature. Such extremes of heat and cold, such wide variation in temperature and humidity make certain foods even more sensitive to damage and make more emphatic the need for absolute packaging protection.

The ideal package, for any one of these divisions of frozen foods packaging, will combine all the desired protective features, sturdy construction and the more practical advantages of easy set-up, filling and closure, but the first and more important packaging rule is: "Protect against moisturevapor loss!"

NAME OF MATERIAL MACHINE OR CONSTRUCTION	DEFINITION
ADHESIVE:	Any viscous substance used t attach one material to anothe Those commonly used in th manufacture of paper boxes a animal glue, vegetable glue (ho or cold), gums, dextrins, an paste
BALING PRESS	Machine for baling scrap
BAND	Strip of covering paper aroun sides and ends of box, witho turn-in
BASE	Lower unit or receptacle of paper box
BENDING MACHINE	Machine used for bending sid of base, lid, or tray
BLANK	Any die-cut, scored and corne cut, or otherwise partially pr pared section of boxboard, in th flat, to be formed into a box part thereof, e.g., base, lid, tray.
BOTTOM	Under surface of the base
BOTTOM LABEL BOTTOM PAPER	Paper attached to bottom under surface of base
BOX	A complete paper box, includi base and lid; also used for *ba* alone (see above)
BOXBOARD	Board used in the manufacture paper boxes*
COMPARTMENTS	Sub-divisions in a box formed partitions
	Placing lids on bases
CONTAINER	Large paper box used to ho definite number of smaller box
CORNER	The line formed by junction sides and ends of base, lid, tra
CORNER-CUTTING MACHINE	For *Board:* Machine for remo ing corners from scored blan and for cutting triangular pie from "ended" box blank, so th side and bottom flanges w bend without interferen Available in single, doub quadruple models
	For *Paper:* Machine for cutti corners from paper blanks us in loose and tight wrappi operations
COVER	Upper or closing unit of a pa box
COVERING MACHINE	Machine used in covering, tri ming, or bending boxes or pa thereof with *paper from r* Available in hand-operated power-driven automatic mod
CUTTER	Machine for cutting boxboa paper, and other materials i sheets or strips of smaller dim sions
CUTTING AND CREASING PRESS	Machine for cutting and creas and die-cutting or scoring bla in boxboard
CUTTING RULE	Steel strips, ground to center side face used for cutt through stock
CUT-SCORING RULE	Steel strips ground to center side face, used for partially ting through stock, i.e., scor form for purpose of formin bending line
CREASING RULE	Steel strips with oval face, u to form a crease or bend a lin stock
DIE-STAMPING PRESS	Machine used in reproducing sign or lettering from engra plates
DIVIDERS	Loose strips of paper or b board used to separate comm ties placed side by side
DOMING MACHINE	Upright press for embossing doming by applying heat pressure
DROP-END	A box in which the end of base is made in two parts, hinged to the other, or in wh end is hinged to bottom
DROP-SIDE	A box with the side arrange described above
DRUM	Shell or tube with paper h for powder box
DUTCH TOP	Lid with padded top slig smaller than lid in length width; set-up with shell
EASELS	Supports attached to box to it upright for display purpo
EDGE	Line formed by junction of and ends to top or bottom o base, or tray

* For descriptions of grades, see "Boxboards—Types a

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GLOSSARY OF SET-UP BOX TERMS

TION	NAME OF PROCESS OR OPERATION
ibstance used to erial to another. ly used in the paper boxes are getable glue (hot s, dextrins, and	
ling scrap ng paper around of box, without	Baling Banding
receptacle of a	
for bending sides tray	Bending
cored and corner- ise partially pre- boxboard, in the ed into a box or g., base, lid, or	
f the base d to bottom or f base	Bottom setting Bottom pa-pering
er box, including also used for *base* e)	
he manufacture of	
n a box formed by	
bases	Closing or lid-ding
ox used to hold r of smaller boxes ed by junction of of base, lid, tray	
achine for remov- om scored blanks g triangular piece box blank, so that com flanges will ut interference. single, double, els	Corner-cutting Mitering
achine for cutting paper blanks used tight wrapping	
ng unit of a paper	
in covering, trim- ing boxes or parts *paper from roll.* nand-operated and automatic models	Covering
cutting boxboard, her materials into s of smaller dimen-	Cutting
utting and creasing g or scoring blanks	Cutting and creasing Die-cutting
round to center or sed for cutting	
round to center or l for partially cut- stock, i.e., scoring pose of forming a	
ith oval face, used se or bend a line in	
in reproducing de- ing from engraved	Die stamping
of paper or box- separate commodi- le by side	
s for embossing or pplying heat and	
ich the end of the in two parts, one other, or in which to bottom	
he side arranged as ve	
with paper head, ox	
dded top slightly lid in length and p with shell	
ched to box to hold r display purposes	
by junction of sides op or bottom of lid,	Trimming or edging Trimming upper and lower edge of lid, base or tray

xboards—Types and Selection," p. 108.

NAME OF MATERIAL MACHINE OR CONSTRUCTION	DEFINITION	NAME OF PROCESS OR OPERATION
ENDING MACHINE	Machine for attaching ends to base or lid. Available in single or double model	Ending or end setting
ENDS	Pieces of boxboard attached to side and bottom flanges of ended box	Ending or end-setting
EXTENSION EDGE MACHINE	Machine for attaching piece of boxboard to top of lid or bottom of base, the piece of boxboard being greater in length and width than the lid or base	Extension edging
FLANGE	That part of a blank that is glued for attaching ends, or sides, or for joining the ends of shell blank. Also the walls of any corner box blank	
FLAP LID	Lid without sides or ends, hinged to base	
FLIES	Strips of plain, printed, or lace paper attached to inner edge of base to cover goods or for decorative purposes	Flying
FLYING MACHINE	Machine for cutting, gumming, and attaching flies	
INVERTED TRAYS	Trays, stayed, or unstayed, placed inside base, inverted	
FILLERS	Loose strips of boxboard, plain or scored, used to fill spaces not occupied by commodities	
FRAMES	Die-cut or mitered forms of boxboard so shaped as to form a display frame for the goods	
FRENCH LID	Lid with extension edge which has sides and ends less in depth than sides and ends of base, and which fits over outside of base	
GLUER	Machine for applying adhesive to surface of paper or boxboard	
HAND SHEARS	Hand-operated knife for cutting sheets of paper, cloth, lace, etc.	
	Any process in the manufacture of a paper box performed without the aid of a machine	Hand work or table work
HINGE	Strip of cloth or paper used to hold parts of box together	Hinging
LABEL	A plain or printed piece of paper attached to box or any part thereof; distinct from top or bottom paper	Labeling
LACE	Paper decoration stamped or embossed to imitate lace or embroidery	
LAP	Portion of cover paper that overlaps where ends of paper are joined on base, lid, tray, shell	
LAYERS	Loose pieces of boxboard used to separate horizontal layers of contents	
LID	The upper or covering unit of a paper box	
LID SUPPORT	Tape or ribbon to hold hinged lid in position when box is open	
LIFTS	Pieces of ribbon, cloth, tape or paper attached to trays for convenience in removing from base	
LINING	Material used to finish or decorate interior of base or lid	
LINING MACHINE	Machine for attaching paper from the roll to surface of boxboard	Lining
LOOSE WRAP	Lid covered with paper, wrap folded and shaped on ends of box, either by machine or by hand; wrappers in one piece with adhesive only at edges	Loose wrapping
MACHINE FORMS	Forms of boxboard, wood, or metal used in conjunction with certain machines, e.g., covering machine forms, wrapping machine forms, quadruple staying machine forms, etc.	
MICROMETER	Instrument for measuring thickness of materials in thousandths of an inch	
NECK	A shell inserted in base, attached by adhesive, and extending above the base into the lid when box is closed (see *Shoulder*)	Necking or shouldering
NEST	Collection of boxes of various sizes, one within another†	
	Bundling and wrapping boxes in kraft paper for delivery	Package wrapping
PACKER	Same as *Container*	
PAD	Card or layer covered with paper or cloth and having one or more layers of wadding or other padding	Padding

† According to present ruling for Freight Classification:
Unless otherwise provided, ... nesting means that three or more different sizes of the article for which the "nested" specification is provided must be enclosed each smaller within each next larger; or that three or more of the article for which the "nested" specification is provided must be placed one within the other so that each upper article will not project above the next lower article more than one-third (1/3) of its height.

NAME OF MATERIAL MACHINE OR CONSTRUCTION	DEFINITION	NAME OF PROCESS OR OPERATION
PADDED TOP	Extra top, covered with paper or cloth and having one or more layers of wadding or other padding; attached to top of lid	Padding
PAPERS	The following is a list of papers commonly used in the manufacture of set-up paper boxes: News, Book, Label, Manila, Kraft, Friction Glazed, Flint Glazed, Brush Finish, Embossed, Printed, Florals, and Fancy. For descriptions	
PARTITIONS (loose)	Slotted pieces of boxboard fitted together to form a series of compartments, and placed in base without being attached to it	Slotting
PARTITIONS (solid)	Any construction of boxboard or other material attached to interior of base to sub-divide it	
PATCH	Piece of paper or cloth over lifts, pulls, support for lid, or hardware inside box	
	Process of removing portion of thickness of board from shell or blank flanges	Peeling
PULLS	Metal handles or pieces of tape or ribbon attached to base of shelf or file boxes for convenience in removing from shelves	
REENFORCING	Strip of paper or string under cover paper	
ROTARY BOARD-SLITTING MACHINE	Machine for slitting sheets of board into sheets of lesser width	
ROUND AND OVAL CUTTING MACHINE	Hand-operated machine for cutting round and oval tops and bottoms	
SCORING MACHINE	Machine for scoring and cutting boxboard	Scoring
SHALLOW LID BOX	A box having a lid of less depth than the base	
SHELL	A glued blank, any shape but round tube, open at both ends	
SHELLS (loose)	Shells used to support layers	
SHOULDER BOX	Box with a glued neck so inserted that ends and sides of base form a shoulder upon which lid rests	
SHOULDER BOX GLUING MACHINE	Machine used to glue in necks	
SLIDE BOX	Box with lid in shell form, into which base is inserted at side or end	
SLITTING MACHINE	Machine for slitting rolls of paper into rolls of lesser width	Cutting or slitting
SLOTTING MACHINE	Machine for cutting slots in boxboard for forming partitions	Slotting
SLOTTING SAW	Saw for cutting slots in boxboard for forming partitions	Slotting
STAY	Material used for reenforcing corners of base, lid, or tray; may be of paper, cloth, combination (cloth and paper), wire, or metal	
STAYING MACHINE	Machine for reenforcing corners of paper boxes or parts thereof. Available in single and quadruple models	Staying
STENCIL MACHINE	Machine for applying adhesive to edges of paper to be used on wrapping machine	Stenciling
STEPS	Shells or trays of varying sizes attached inside base to raise one row or portion of contents higher than the row next in front; or attached inside lid to hold articles of various heights in place	
STOPS	Pieces of boxboard attached inside of ends of lid to hold base in proper position when height of base is less than height of lid	
TAPE	Woven or braided cotton material	Taping
TELESCOPE BOX	A box with base and lid of the same depth	
THUMB-HOLE	A semi-circular or triangular cut made in sides or ends to facilitate removal of lid from base, or contents from base.	Thumb-holing
THUMB-HOLING MACHINE	Machine for cutting thumb-holes	Thumb-holing
TIGHT WRAP	Lid, base, or tray covered with paper, wrappers being in one piece and having entire surface covered with adhesive	Tight wrapping
TOP	Outer surface of the lid	
TOPPING MACHINE	Machine for attaching top or bottom paper	Topping
TOP-PAPER	Paper attached to top of lid	
TRAY	A receptacle for which no lid is made	

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Set-up paper-covered boxes

by William J. McClintock, Jr.

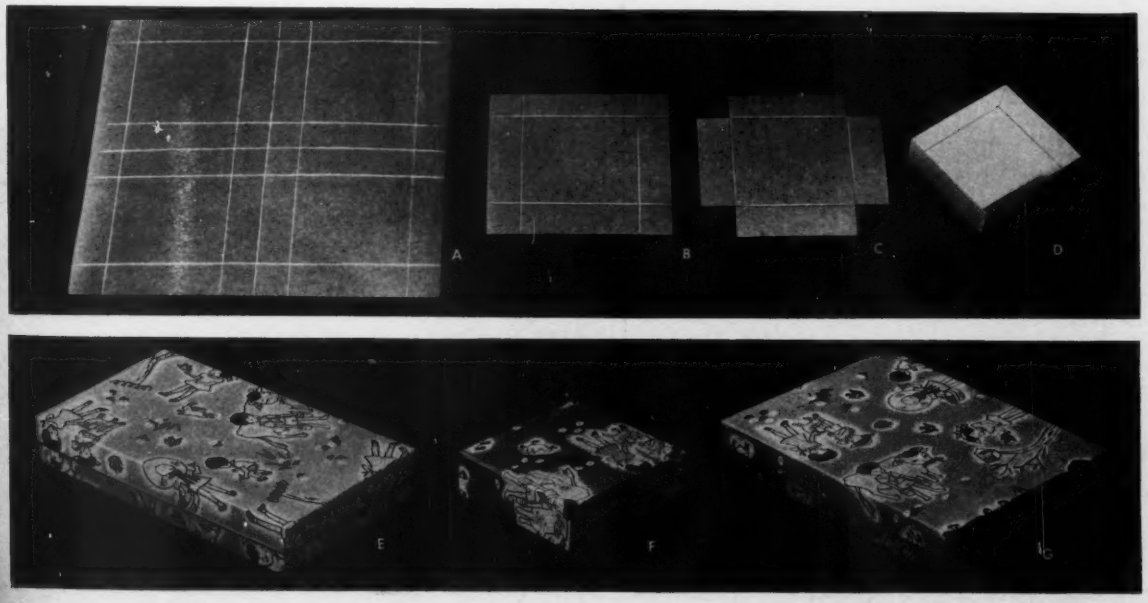
The current trend, a wartime necessity, has changed the form of service being rendered by the set-up box manufacturer. Many types of decorative packaging have been abandoned for the duration. Limitation Order L-239, issued early in 1943, prescribed size specifications for retail set-up boxes and restricted the manufacture of boxes from virgin wood pulp. But this by no means precludes the use of set-up boxes because this form of package has few wider applications for utility other than obvious decorative advantages.

Any rigid paper box that is delivered in finished form is termed a *set-up paper box*. This type of box is delivered to the user ready for the inserting of merchandise without further processing. In contrast to the bending boxboard used for folding boxes, non-bending or rigid boxboard is used for the set-up type. Whereas the minimum thickness of boxboard for folding boxes is .016 in., the minimum for set-up boxes is .030 in. Set-up boxes can be handled and packed speedily and this combination of advantages is utilized in many packages of excellent protection and beautiful design for such merchandise as perfumes, cosmetics, lingerie, candy, stationery, hosiery, handkerchiefs, pharmaceuticals, etc.

All measurements for paper boxes should be given or accepted in terms of inside measurement only (score measure). The measurements should be stated in the following order: length, width, depth; and when a fourth dimension is given it should indicate the depth of the lid. For instance, 10 × 5 × $2\frac{1}{2}$–$\frac{7}{8}$ indicates a box 10 in. long, 5 in. wide, and $2\frac{1}{2}$ in. high, with a lid $\frac{7}{8}$ in. deep. For a box with a shoulder, measurements should indicate the inside measurement of the neck, followed by the depth of base and lid, for example: 10 × 5 × $2\frac{1}{2}$ neck, $1\frac{5}{8}$ base, $1\frac{1}{4}$ lid.

The application of fancy papers or specially designed wraps gives an appearance of permanence and beauty to set-up paper boxes, while the combination of rigid transparent covers and set-up bases produces a box with unusual display value. There is still a variety of beautiful papers available despite wartime restrictions. Produced economically in rolls, from which wraps can be cut, these papers offer splendid possibilities for diversification of color and decoration in this type of box without the necessity of purchasing extremely large quantities to absorb the cost of art work, engravings, etc. Where a fixed design is required, wraps may be printed, embossed, hot-stamped, die-stamped, engraved, lithographed, photo-offset—in fact, any decoration that can be applied to paper may be used on the wrap for a set-up box. Because of the rigidity of these boxes, many interesting decorations can be used with good effect and lasting beauty. • Note illustrations on following pages.

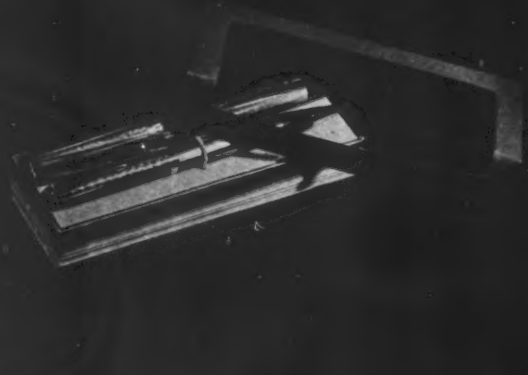
Steps in making set-up paper boxes: A. Sheet of boxboard is first scored to size specified. B. The scored sheet is then broken into individual box blanks. C. These are corner cut. D. Next, they are turned down and corner stayed. The lid of the box is processed in a similar way. E. Lid and bottom form simplest set-up box, a "skeleton" box with shallow lid. F. Next type is the full-telescope lid, made by increasing its depth to that of base. G. Shoulder style is made by adding an extra base or by the insertion of a board which has been scored to form an inner shoulder.

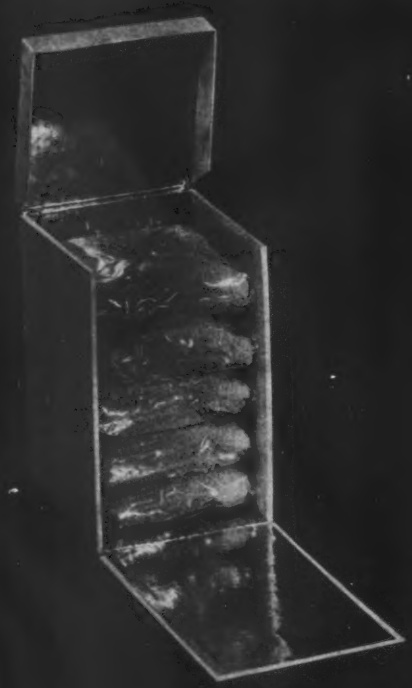


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Types and Styles of

1. COSMETIC BOX WITH EXTENSION-EDGE BASE. There is a die-cut platform which holds each item in place and prevents jostling. The lid is full-telescope type into which is inserted an ingenious tray. The die-cut hole in the tray fits down over the box of powder and keeps all the other items in position.

2. BOX FOR PEN AND PENCIL SET. It has an extension-edge base, covered with gold lacquered paper, which is tight wrapped. An ivory-colored platform is glued to the base and is fitted with elastics. The lid is lined inside with red flint paper and die cut so that the window extends down the front flange. The outside of the lid is also covered with red flint paper.

3. SHALLOW LID BOX FOR BATH MITTS. It has a drop front and hinged lid with mitered corners. The insides of the lid and of the base are lined with heavy gold foil. The outside covering is of white flint paper. Lid and base are full tight wrapped. Boxes of this type enhance the quality of the product which they contain and make effective display pieces for windows, counters or other product exhibit space in drug or department stores.

4. OCTAGON SHAPE, SHOULDER BOX FOR POWDER. Base is banded with ivory paper which has gold trim on edges and there is an ivory bottom label. Lid top is set in an octagon shell and banded with ivory paper with red trim on edges. The powder is contained in a non-sift box inserted in the tray. The ivory paper covering the top must be cut away before the powder can be removed. Depth of inside powder box is sufficient to allow room for puff. Lid has embossed label.



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Set-up Paper Boxes

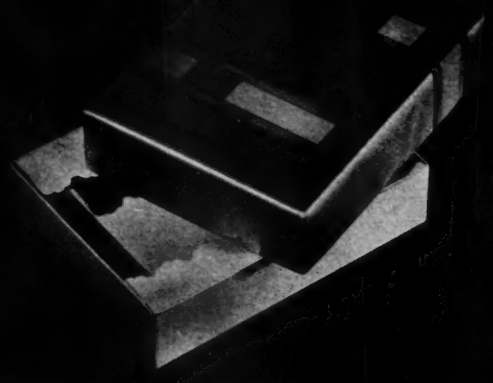
5. HOSIERY BOX WITH SHOULDER. Lid is hinged and is loose wrapped with striped paper in gold and ivory colors. The base is tight wrapped in gold paper, printed with brand name. The name is repeated on the inside of the lid, but it is die stamped for added effect.

6. LOOSE-WRAPPED TELESCOPE CANDY BOX. Note that base and lid are of the same depth. Folds at each end of the lid show that it has been loose wrapped. The top edges of the base are trimmed with paper lace. This type of box has a multiplicity of uses—hosiery, lingerie, candy, handkerchiefs, etc.

7. COLOGNE BOX WITH SHALLOW SHOULDER. Base and lid are banded, with top and bottom edges trimmed. The bottle rests on a tray within a cardboard frame. A triangle of cardboard supports the neck of the bottle. The inside lid is fitted with a pad of tan velour paper with brand name printed in gold. The top paper is embossed and the bottom paper matches the inside liner in color.

8. OVAL-SHAPE FACE POWDER BOX WITH SHOULDER. The base is hand covered with a printed paper showing a black lace edging on dusky pink and has a dusky pink bottom label. Powder may be seen through window in an inner liner. The lid is covered with pink paper and it has a black trim around the top edge. There is a printed top label with brand name in black.









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9. TOILET WATER BOX WITH SHALLOW BASE. Four small individual trays are inserted to form the shoulder. Base and trays are tight wrapped as well as the lid which fits snugly on the shoulder. Lid wrap is printed with the brand and product names.



10. SHOE BOX WITH SHALLOW LID. This type of box is distinguished from the telescope style by having lid which is shallower than the base. Both lid and base are tight wrapped. Paper covering for base is printed in light green with Peter Pan figures. Lid carries product information.



11. SOAP BOX WITH SHOULDER AND HINGED LID. The base is tight wrapped. The lid is banded and the top and bottom edges of the lid are trimmed with gold paper. The top paper has hot stamped decoration. Bars of soap are kept intact with a single shell into which the middle cake of soap fits.



12. TELESCOPE TYPE BOX FOR HOSIERY. Both the base and the lid are tight wrapped. This method of wrapping is used most often for boxes such as this, which are intended for units of relatively inexpensive merchandise. Paper used for wrapping the lid is white and is printed in color with name and product identification.

XUM

Molded pulp for packaging

Molded-pulp containers are made from reclaimed or new fibrous paper pulp, combined with binders of certain chemical formulas or plastic resins. The paper pulp may be a mixture of sulphite and kraft. Its degree of strength is dependent upon the amount of kraft used in the mixture. They are cast from molds of bronze or other metals, previously made from plaster models of the desired shapes.

Molded pulp has been used extensively by the poultry industry to protect eggs from breakage during shipment. Millions of molded pulp and pressed pulp pie plates are used annually in the baking industry. These are made with dies and plungers, and are limited to a dish-shaped unit. Another important use is for the protective sleeves used over bottles of liquor. In more unusual shapes, molded pulp, made by the blown method, is used widely for making decorative novelty containers for candy, lingerie, hosiery and all manner of dry merchandise for which an individualized container provides striking counter display. Some 10,000,000 molded pulp units like the pumpkins seen on candy counters, were sold in chain and syndicate stores in 1940. Custom-made molds are also important for trademark identity.

Molded pulp containers have many advantages:

1. They are light in weight.
2. May be seamless because two halves can be molded in one piece.
3. Are crush resistant.
4. Offer excellent opportunity for distinctive design and individuality of shapes.

The two important processes for making molded pulp containers are as follows:

1. ***Suction method***—This process is used for mass production of the flat dish types of containers such as egg containers and pie plates. The molds, drilled with holes, are attached to the spokes of a rotary conveyor. A fine screen fits over the outside of the mold. As these molds move around the conveyor they are submerged into vats of the pulp mixture. By suction the required amount of the pulp mixture to make the container is lifted from the vat against the screen and pressed by male and female dies. The mold then moves on; the completed container is finally removed from the mold and put through the dryers. The complete operation is automatic and it is possible to make large quantities with great speed and at very low cost.

2. ***Blown pulp***—Some novelty molded-pulp containers such as boots, barrels, liquor bottle sleeves, figurines, are not made with dies and plunger but are made by the blown-pulp method. A bronze shell or cavity drilled with holes is lined with a metal screen made in the same shape as the shell. By gravity, the pulp mixture fills this cavity and by air pressure is forced against the screen within the mold and is also dried by super-heated air. When the unit molded is dried sufficiently, the mold opens automatically, the unit is removed and passed along on a conveyor for further drying. After that the container is ready to have decorative effects applied. Production reaches about 20,000 containers a day.

Decoration

Color effects may be achieved by dyeing the pulp material to the desired shade or by applying color with a brush or spray. The containers may be lacquered to provide a high glossy luster. Lettering and trademark designs may be incorporated at the time of molding by novelty embossing or debossing. Labels may be affixed later.

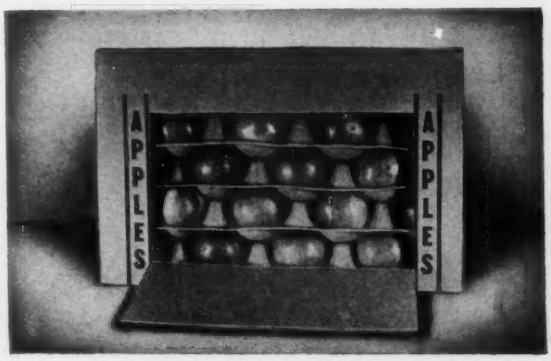
Molded pulp containers are obtainable in stock molds. When an unusual design is required, an individualized mold may be made. Bronze molds may be made on the average from $150 to $500.

New developments

Many new uses and developments of molded pulp may come as the result of material shortages due to the emergency economy. Reports are that experiments have been conducted to develop paper pulp as a substitute for cork. Molded pulp protective pieces to protect corners of furniture during shipment have also been used successfully in place of corrugated materials. They are easy to handle because they can be made in the exact shape required.

Another recent development is a molded pulp product carrying a synthetic resin content, reputed to have all the advantages of plastic molding compounds plus greatly increased strength and latitude in color and decorative effect. Eventually this material may have a part in the packaging picture.

Apples, like eggs and other perishable foods, now travel in molded-pulp trays. These are moisture-resistant, oil-sprayed. Individual nesting keeps each piece of fruit in its original position. Photo Mapes Consolidated Mfg. Co.



Decorative & re-use boxes



Fancy packaging has always been indispensable in the jewelry and cosmetic fields. Thus, they have suffered not only because of shortage of the materials from which their products are made, but they have been deprived of many of their accustomed materials for packaging. This has had two results: first, a cheerful acquiescence in complying with restrictive orders as their contribution to the war effort, and, second, a manifestation of ingenuity in the use of substitute materials for packaging.

In the jewelry field, where metal containers have for many years been the most widely used, three changes have developed. Firstly, a type of pulp material which can be pressed or embossed into shapes similar to those previously stamped out of metal was found. The same mechanical covering equipment was usable if the inside dimensions of the new cases were the same as those of the old metal containers. It was thus found possible to continue the use of most of the equipment and dies formerly used for "finishing" the linings and inside fittings of the cases.

The second substitution in the jewelry field is the change from metal to cardboard, which is covered with imitation leather, velvet, etc. Only those shapes which can be made out of scored cardboard are possible. Fancy shapes—except for octagonal corners and certain types of extension bases—are not possible under this process of manufacture.

Wood packages

The third substitution is wood which is even taking the place of now very critical cardboard. Wood permits a wide latitude of design effects, and many interesting wood packages have already found their way into the market. Wood boxes are almost entirely handmade, and so may be used only for the more expensive jewelry items. A wide variety of finishes, ranging from natural wood effects to lacquer finish in any color, is still available for this use.

Probably the most popular material for wood containers is gumwood, though most of the cabinet hardwoods —cedar, walnut, mahogany, oak, sycamore, poplar and maple—are equally usable. Cedar was popular as the material for storage boxes because the odor is generally presumed to be a moth preventive.

Veneers frequently cover less expensive woods used for the frames, though the covering may be of embossed paper, simulated-grain fabrics and leather-like sheets. Special machinery, however, is necessary to apply such final finishes. In the days of luxury containers, silks,

1. Wood and glass continue the sales job and packaging task in wartime. 2. Cardboard frames, fabric covered, replace metal for decorative boxes. Photos Arrow Manufacturing Co. 3. Weatherproof wooden tool kits have many uses in factory and home. Photo Pilliod Cabinet Co.

satins, duvetyns and even mirrors formed all or part of the interior finish.

It is difficult to predict what woods will be available. Hardwoods, which are the most decorative, are practically impossible to secure without priorities. As a result, more consideration must be given to adequate finishes, so that the quality of the wood becomes secondary.

One reason for the popularity of wood packages is their re-use value—candy makers have filled smart-looking containers with their product but designed the box to be used afterwards as a jewel case or handkerchief box. Men's belts and jewelry were frequently sold in wood cases that could later be converted into atttactive cigarette boxes.

Die-cutting is one of the metal-trade tricks that has been adapted to fabricating wooden objects. A special process for sealing the pores of the wood makes permanent accuracy of contact points possible, and it avoids the moisture absorption which would throw the container out of gear.

Pins and dowels have been used for hinging devices, and ingenious locking devices have been worked out by using dovetailed wood pieces.

Wooden tool kits, fitted with hinges and handles, are doing double duty as both storage and carrying cases. By methods of drying and processing, most of the moisture normally found in wood can be driven out, and the wood is protected against re-absorption of water which would ordinarily cause warping and swelling. Waterproof adhesives and finishes further facilitate the production of wholly weatherproof cases and add materially to their utility.

Wood packages for these specialized uses cannot be produced in every plant equipped for woodworking. It is to the advantage of a tool or precision-instrument producer to confer frankly with the makers of wood cases. A sample of the intended contents—or at least an accurate sketch of exterior shape and dimensions—is almost a prerequisite in order to obtain a satisfactory kit.

Production methods have been developed for making small boxes and cases in unusual shapes and finishes, for use where only small packages are needed, and where the use of wood has been very limited in the past. They are especially suitable for packaging small cosmetic articles, rings and watches, and will no doubt introduce into these fields that beauty and distinction which can be achieved only in wood. They will be manufactured on specially designed machinery which will make it possible to offer a type of package formerly infeasible in quantity at reasonable prices.

There has been a great increase in the number of screw machines for war production, and many of them will be available for the peacetime manufacture of novelty ornaments and decorations for packages.

Today's wooden lipsticks are made on high-speed screw machines. They are acceptable in appearance, practical to use, and wherever they have been introduced they have been accepted by the consuming public as a "war baby."

Practical and durable compacts are being made of wood, cardboard and combinations of these materials. Fancy shapes are not always possible, but these materials do permit interesting design and effective use of such novelty coverings as bengalines, moires, rayons, novelty ribbed materials, interesting printed cloths, and many other materials.

Leatherette and coated fabrics

These materials have shown a new usefulness since priorities and restriction of basic materials have been made necessary as war-emergency measures. Leatherette, otherwise known as artificial leather, and keratol, coated fabrics, etc., because of their substantial, durable construction, have always been favored as covering materials of those types of containers, boxes or cases of a semi-permanent nature. It should be noted, however, that manufacturers of leatherette have been forced to curtail their production because of Government restrictions placed upon the use of pyroxylin and castor oil—two important ingredients which are used in the manufacture of leatherette.

4. Many all-paper and fabric jewelry boxes replace their metal-framed predecessors. Photo Arrow Manufacturing Co.

4



XUM



PHOTO COURTESY OF VEGA AIRCRAFT CORP.

of Tomorrow's Cargoes

Your product today can be better packaged because of the war. The increased use of air transport for precious supplies has accelerated the time-tried inventiveness of the Warner Craftsmen. They have swiftly learned new ways to lighten the weight of containers, without sacrificing protection.

Warner packages today, as ever, are designed to show your product at its best. But bulk is *out*, excess weight is *out*, to meet the demands of modern transport.

However you ship the majority of your products — today and after the war — these improvements will materially cut your distribution costs. Ask for the recommendation of the Warner Craftsmen — today.



WARNERCRAFT

Makers of set-up and folding boxes of all types, transparent acetate containers, hand made specialties, counter displays and dispensers.

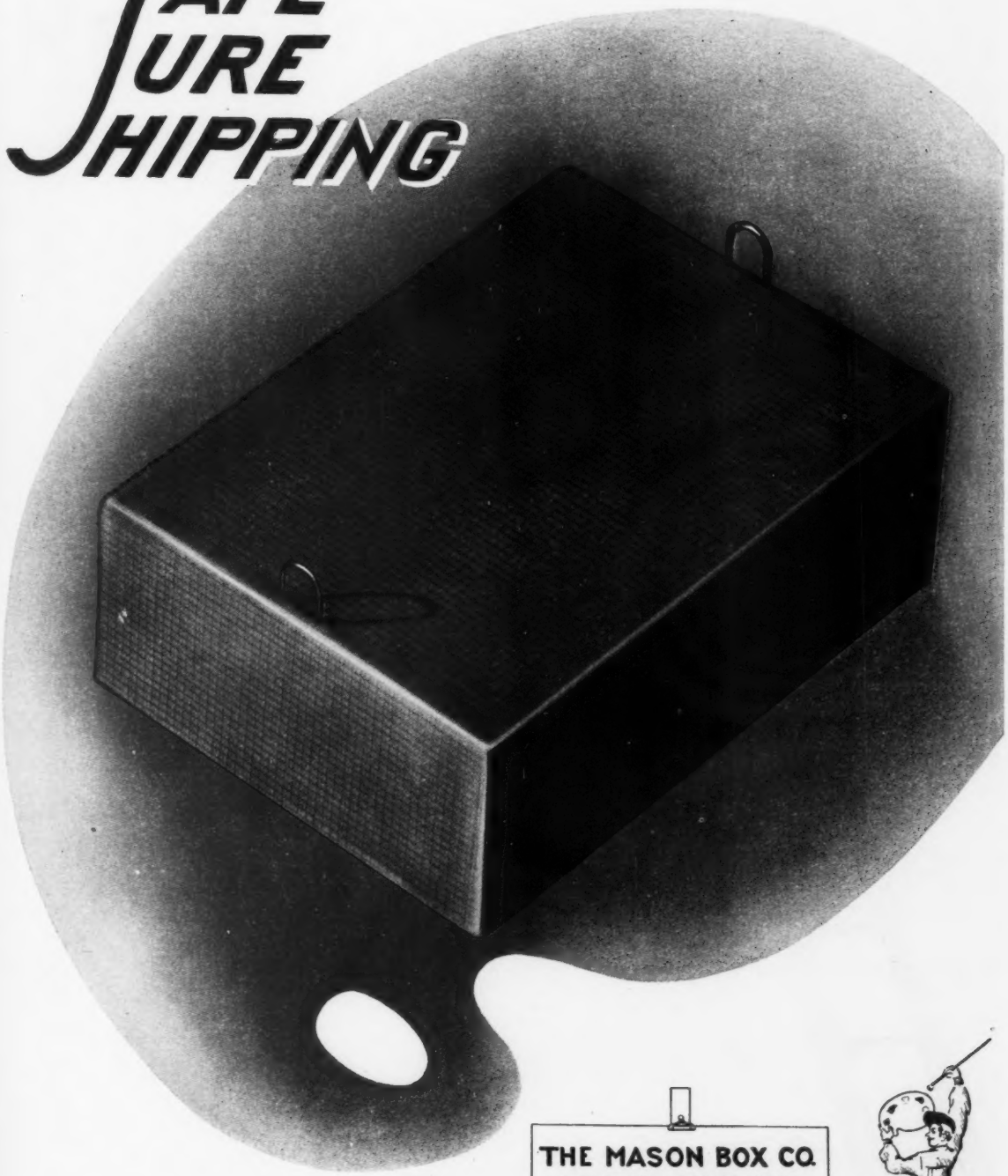
THE WARNER BROTHERS COMPANY

Main Office and Factory: 325 Lafayette Street, Bridgeport, Conn.
New York Sales Office: 200 Madison Avenue, New York, N. Y.

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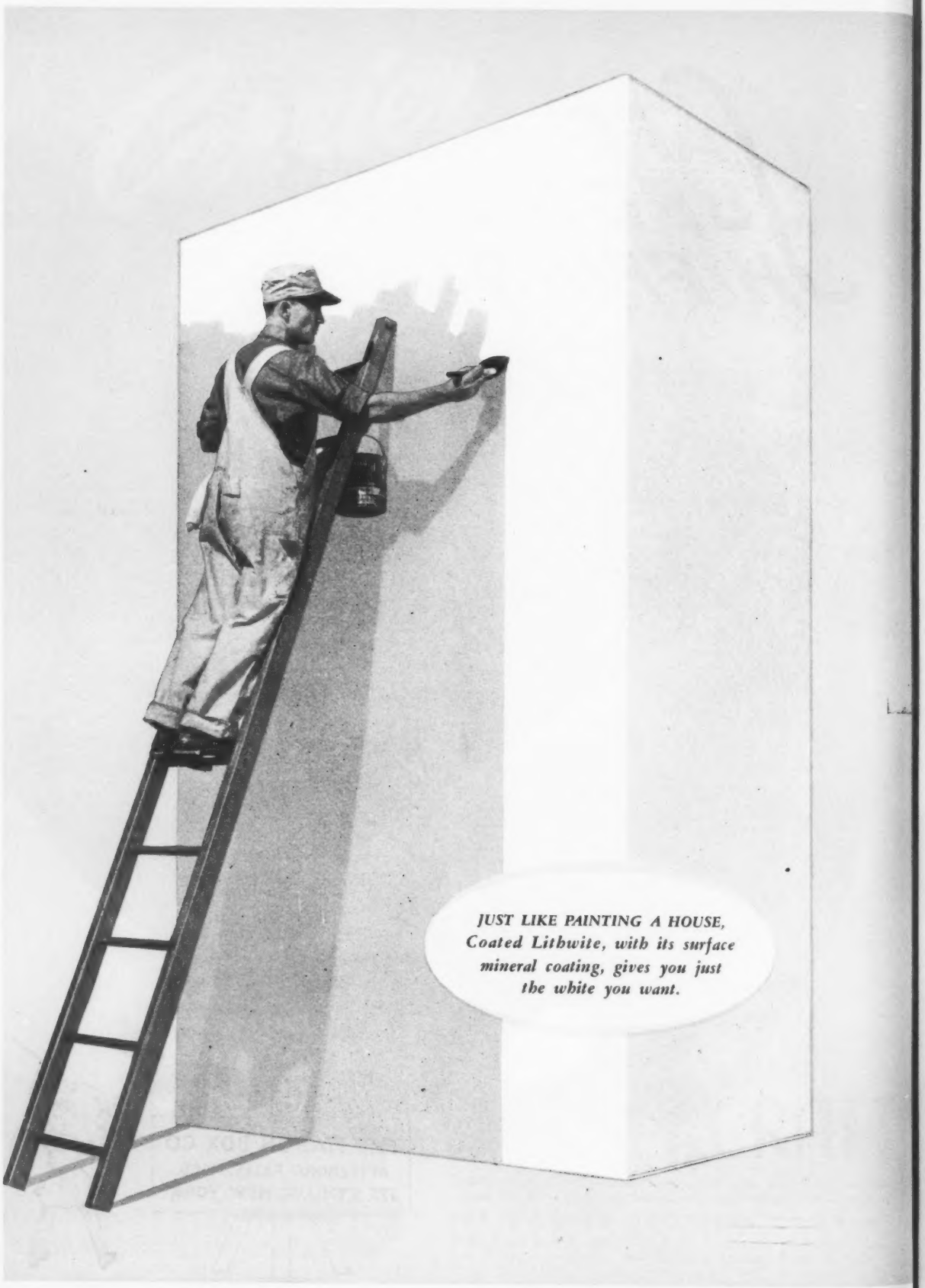
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SAFE SURE SHIPPING



THE MASON BOX CO.
ATTLEBORO FALLS, MASS.
175 5TH. AVE. NEW YORK




JUST LIKE PAINTING A HOUSE,
Coated Lithwite, with its surface
mineral coating, gives you just
the white you want.

As white and bright as ever!

IN THE FACE OF UNUSUAL CONDITIONS, COATED LITHWITE'S UNUSUAL QUALITIES ARE BEING MAINTAINED

IF WHITENESS of paperboard is your problem, *Coated* Lithwite should take those wrinkles out of your brow. For this unique coated paperboard has not been affected by the down-grading of pulps or hard-to-get chemicals. *The surface coating of Coated Lithwite is compounded of noncritical materials!*

That is why today's *Coated* Lithwite has the same whiteness and brightness, the same unusual printing, folding and sealing qualities which caused such a sensation when it was introduced into the folding carton field four years ago.

Remember, *Coated* Lithwite is an entirely new and different type of carton board. It is formed, made and coated on one machine, in one continuous operation—and at incredible speed. The secret mineral coating is layed so evenly, so smoothly — and is so free from "chalkiness" — inks stand up brilliantly, fine-screen halftones, small-point type print sharply, clearly.

Do you want proof? Would you like to compare *Coated* Lithwite with your present cartons? Then write. We will send you printed samples so you can compare the striking qualities of *Coated* Lithwite with your present cartons. Send along detailed specifications and a sample of your present carton, too. We will submit a quotation so you can also make a down-to-the-penny cost comparison with the cartons you are now using.

LET GARDNER-RICHARDSON HELP YOU WITH YOUR POSTWAR PLANNING NOW!

Now is the time to do your basic planning for those new or restyled folding cartons and counter displays—now when there is time to make sketches and adjustments, now when there is time to experiment with constructional features, to select the right paperboard and to make the right kind of plates.

Gardner-Richardson will gladly work with you now, so you will avoid the last-minute rush that's bound to come—so you'll be ready at the first "let's go" signal. Write. We will put our facilities and experience at your disposal—and without obligation.

The GARDNER-RICHARDSON Co.

Manufacturers of Folding Cartons and Boxboard

MIDDLETOWN, OHIO

GARDNER-RICHARDSON — FROM PULP TO FINISHED PRODUCT — ENGINEERED PRECISION

Sales Representatives in Principal Cities: PHILADELPHIA • CLEVELAND • CHICAGO • ST. LOUIS • NEW YORK • BOSTON • PITTSBURGH • DETROIT



MILLIONS OF UNITS OF CARDBOARD BOXES HAVE BEEN PROCESSED FOR OUR CUSTOMERS IN SUPPORT OF THE WAR EFFORT.

★ ★ ★

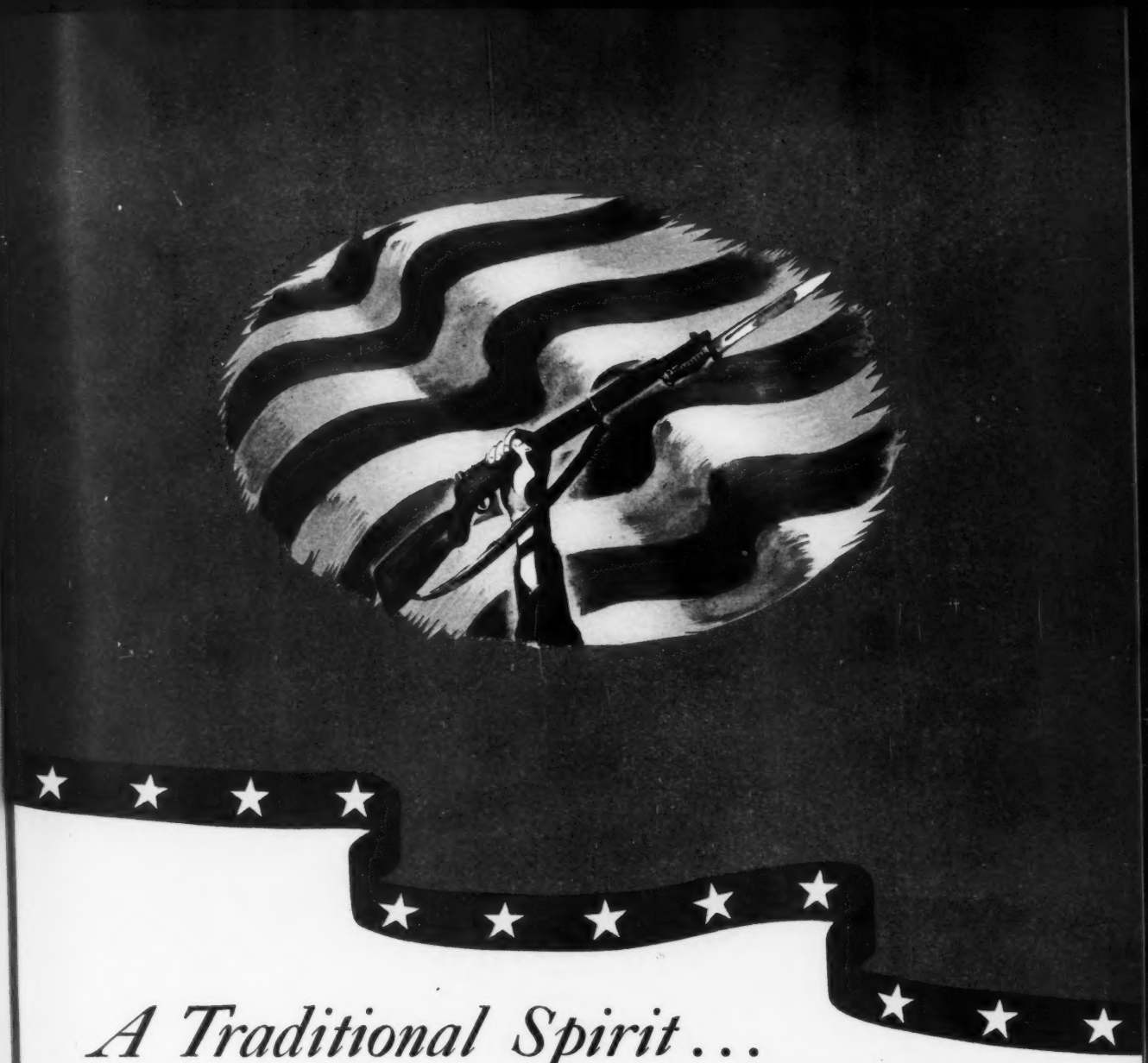
PLANNING AND CREATING TO SERVE YOU—TO MAKE BUSINESS LIFE MOST SUCCESSFUL IS OUR PROGRAM FOR THE DAY WHEN THE FIGHTING IS OVER.

★ ★ ★

WE SPECIALIZE IN PRECISION MADE FOLDING BOXES. THE SIMPLEX TRADE-MARK GUARANTEES A GENUINE SIMPLEX BOX.

SIMPLEX PAPER BOX CORPORATION
LANCASTER PENNSYLVANIA

SIMPLEX
TRADE MARK REG. U.S. PAT. OFF.



A Traditional Spirit . . .

The kind of spirit that triumphs over adversity . . . spirit that has won our wars, built our nation, developed our industry . . . spirit that springs from faith in a way of life and a willingness to work and sacrifice and fight for it — that spirit is traditionally ours.

This is the spirit of industry, too, and we need it in abundance to face the changing conditions and challenging problems that war has brought to packaging.

Much of our carton production is war-born — to do specific jobs — at home and at the fronts, and there is much valuable research and design experience being accumulated . . . experience that our carton men will be glad to share with you for better packaging tomorrow.

MICHIGAN CARTON CO. BATTLE CREEK, MICH.

The WATERBURY PAPER BOX COMPANY



Yep-they make EVERYTHING!



Everything? Well, not quite. But for complete fine packaging and related services we go all the way in design and production. printing for *everything* pertaining to "packaging with pride"; and drawn formed shapes for almost *everything* that could conceivably be pressed out of plastic and fibrous sheets, from coffee jar screw thread caps to electrical insulations—*and we're ready to synchronize our postwar research and planning with yours—Now.*

Economical, beautiful set-up boxes for all products from thread to aircraft instruments; round containers and canisters for *everything* from face powder and dentifrices to industrial abrasives;

New York Office at:

30 ROCKEFELLER PLAZA

Factory at Waterbury, Conn.

In War or Peace

THE STANDARD FOR WINDOWS



Packaging ingenuity has reached a new high as a result of many war applications. The use of material to absorb moisture and thereby protect motors in transit falls in this classification. When it comes to the humidity indicator, a Lumarith transparent window is necessary to make the entire system workable.

TRANSPARENT *Lumarith* FOIL *

a Celanese Plastic



Merchandise calling for protection and eye appeal turned to Lumarith window boxes before the war. When the approach of Victory releases more of this transparent material for civilian uses, merchandisers again will turn to Lumarith to speed up the transition from war to peace by the eye appeal which increases sales.

Transparent Lumarith is the accepted standard for windows. It never shrinks nor wrinkles. It protects the contents of the box and enhances the beauty within. In many war applications, this top ranking transparency contributes the elements of visibility, toughness and wrinkle-free clarity which established its leadership in peace applications. . . . Celanese Celluloid Corporation, *The First Name in Plastics*, a division of Celanese Corporation of America, 180 Madison Avenue, New York City 16.

THE PACKAGING *that Attracts!*



There's a secret, of course, back of the success of ACE Cartons. In a word it's—*appeal!* And when you dismiss your packaging headaches into the hands of ACE you cash-in on unusual manufacturing facilities, an inspired craftmanship, and a *practical* planning that provides maximum merchandising appeal for the job that lies ahead.

While all facilities for the present are devoted to War Packages, we welcome inquiries for future planning.

ACE CARTON CORPORATION

5800 West 51st Street, Chicago, Illinois

FOLDING PAPER CARTONS · FOLDING DISPLAYS · DISPLAY CONTAINERS

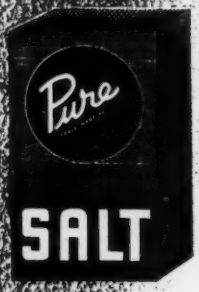
ACE CARTON CORP. ACE CHICAGO *Creators*

Essential FOOD PACKAGING











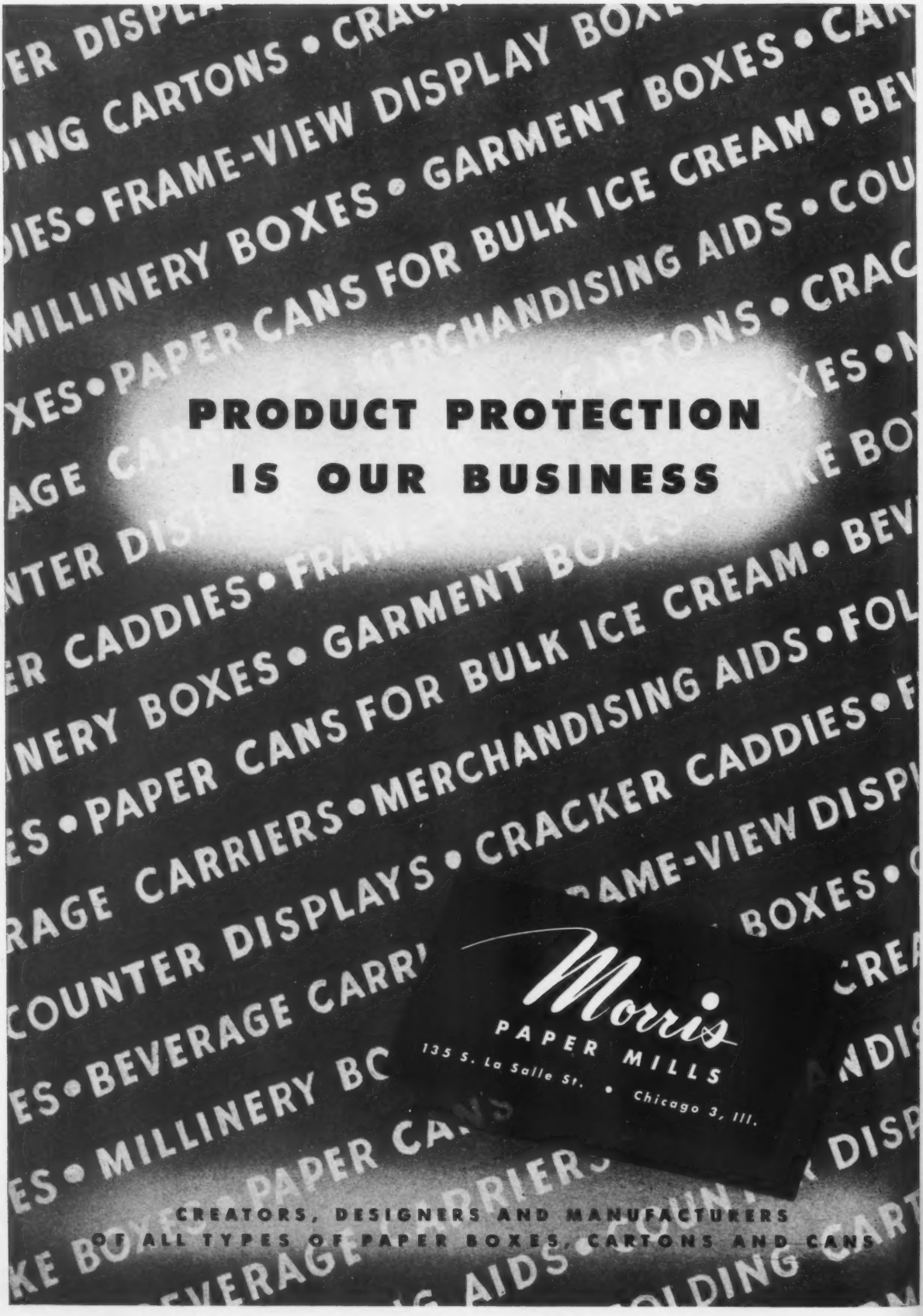


BY R.T.G.

FOOD, FOOD, and yet more FOOD is essential. But how to package it? Metal is out, paperboard is scarce and the "know how" is even scarcer.

Now, more than ever before, service and quality count. The R. T. G. organization was built upon that basis.

THE
RICHARDSON · TAYLOR · GLOBE
CORPORATION


PRODUCT PROTECTION
IS OUR BUSINESS
Morris
PAPER MILLS
135 S. La Salle St. • Chicago 3, Ill.
CREATORS, DESIGNERS AND MANUFACTURERS
OF ALL TYPES OF PAPER BOXES, CARTONS AND CANS

XUM

SMITH CRAFTED CHICAGO

Keeping An Art ALIVE

Post War appeal of fine things — beautiful items of quality — will be greater than ever before —

The Smithcrafted process, with the added advantage of newly developed materials — will be utilized even more extensively than in the past for the reproduction of beautiful art effects in deluxe gift packaging.

The value impression of old established arts — which are so beautifully reproduced, in quantity and quality, by the Smithcrafted process — is and will increasingly be of highest sales appeal.



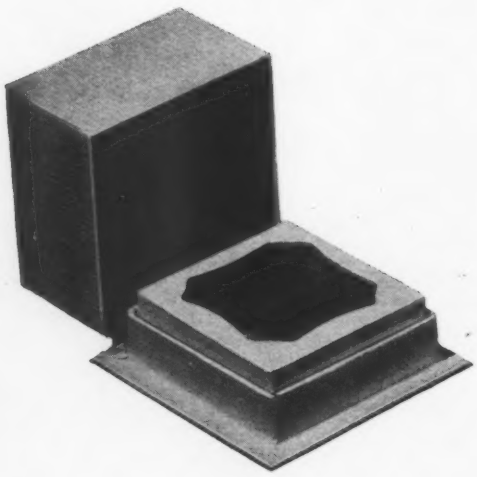
THE S. K. SMITH COMPANY
2857 N. WESTERN AVE. CHICAGO, ILL.
New York Office, 52 Vanderbilt Ave., MUrray Hill 9-8290

XUM

Jewelry and Novelty Boxes of Distinction



For your post war needs, in modern designed jewelry packages and cases by unexcelled craftsmen, we are at your service.



Watch Boxes — Ring Boxes
Lavalier Boxes — Nest Boxes
Pearl and Rosary Boxes
Pen and Pencil Boxes
Trays — Displays
Transparent Boxes
Plastic Jewelry Boxes

Exclusive Boxes Designed to Fit Individual Requirements



UNIVERSAL JEWELRY CASE CO.

CHICOPEE, MASS.

NEW YORK • PHILADELPHIA • PROVIDENCE • CHICAGO • LOS ANGELES • NEW ORLEANS



MASTER CRAFTSMEN

BALTIMORE, MD.
Maryland Paper Box Co.

BOSTON, MASS.
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BROOKLYN, N. Y.
Specialty Paper Box Co.
E. J. Trum Co., Inc

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Thoma Paper Box Co

CHARLOTTE, N. C.
Old Dominion Box Co

CHATTANOOGA, TENN.
Atlas Paper Box Co.

CHICAGO, ILL.
Kroeck Paper Box Co

COLUMBUS, OHIO
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Friend Paper Box Co.

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MERIDEN, CONN.
Shaw Paper Box Co.

NEWARK, N. J.
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Newark Paper Box Co.

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PAWTUCKET, R. I.
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PROVIDENCE, R. I.
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Great Western Paper Box Co.
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UNTIL VICTORY IS WON — BUY BONDS

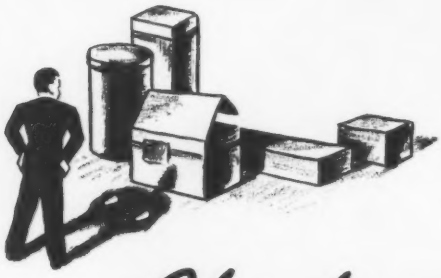
TODAY, war production comes first. But to create post-war jobs, numerous manufacturers have already completed plans for products they will turn out in peacetime. And many of these products will be packaged for added sales appeal in set-up paper boxes. The custom-built set-up paper box is the most versatile of packages; and none is more beautiful. Its attractive covering papers enhance its appeal.

If you are an executive interested in post-war plans, why not talk to a Master Craftsman in the field of packaging. Like yourself, these men are creative, welcome a problem, and know how to produce economically.

Master Craftsmen

OF THE SET-UP PAPER BOX INDUSTRY

Cooperating Suppliers: Appleton Coated Paper Company; Blackstone Glazed Paper Company; Bradner Smith & Co.; Louis Dejonge & Co.; Globe Mfg. Co.; Hampden Glazed Paper & Card Co.; Hartford City Paper Co.; Hasen Paper Company; Holyoke Card & Paper Co.; Hughes & Hoffman Co.; Lachman-Novasel Paper Co.; Marvelium Company; Matthias Paper Corp.; Nashua Gummed & Coated Paper Co.; Pejepscot Paper Co.; Plastic Coating Corp.; Racquette River Paper Co.; Stokes & Smith Co.



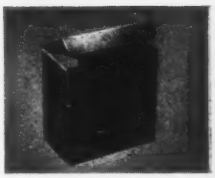


Check BERLES' SERVICE

for merchandising, protection

A quick glance at our war production and our civilian packages gives you an idea of what Berles' carton service has to offer you.









PROTECTION

If you need a protective carton—we have been manufacturing special wax-coated containers for ice-cream and butter for many years. Lend-lease dehydrated, hygroscopic foods are protected with special Berles laminations, fabricated into efficient, compact containers.

MERCHANDISING

If merchandising is your criterion, our transparent cellophane window cartons will help your product sell itself just as they do for many market leaders. Also, Berles quality color printing, backed by a creative package design service, will make the most of surface decoration for your product.

We will be glad to send you samples or suggest designs to suit your requirements.

BERLES CARTON CO. INC.

86 FIFTH AVENUE

PATERSON • NEW JERSEY

If Your Metal Has Gone to War
Use ROWELL Boxes More and More

dress your merchandise in a Rowell product

We Specialize in Boxes for the Druggists, Chemical Manufacturers and Cosmetic Trade, as well as Labels both Printed and Lithographed.

E. N. ROWELL CO., INC.



PAPER BOXES

BATAVIA, N. Y.

PLEASE



FORGIVE US

DEAR CUSTOMERS—

We plan our production schedule — what a rosy picture. We ration each customer to satisfy everyone fairly — (customer's viewpoint — we satisfy no one).

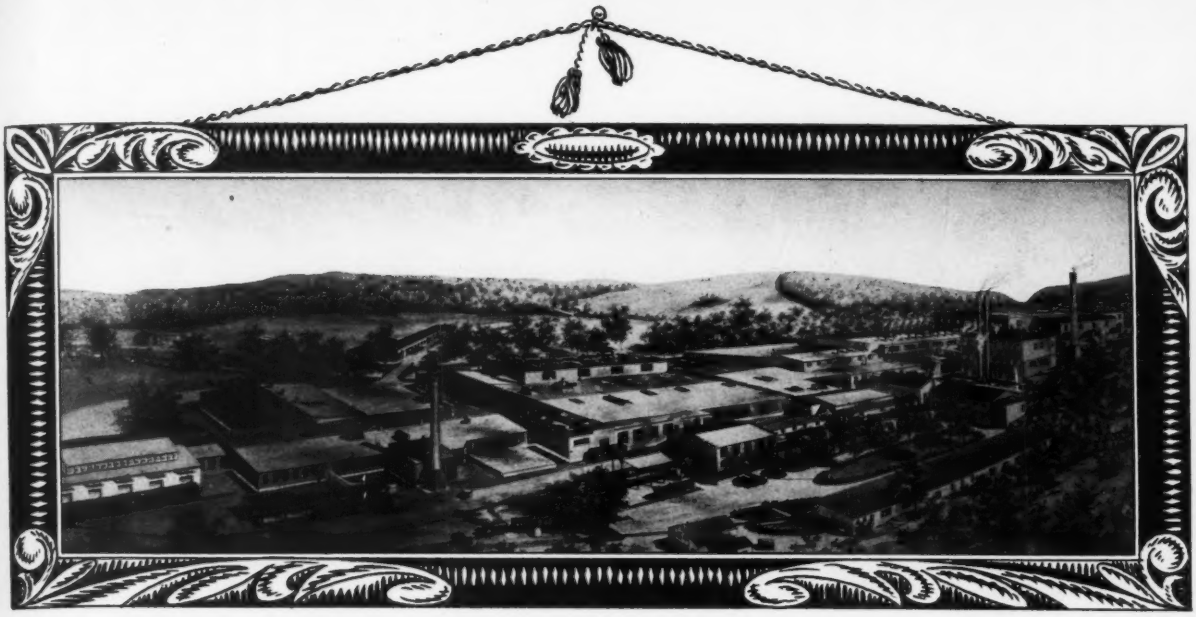
The man with the high hat and silky whiskers has a job for us — you know — AA1 - AA2 — etc. DIRECT HIT upsetting that schedule. A set-up box or fibre container to deliver the goods to our boys. Who deserves more?

We simplify packages to conserve paper, cardboard and labor to help that schedule.

Our suppliers tell us of their headaches and pass them on to us.

Oh, well — America is a grand place after all — we still have a sense of humor.

SHOUP-OWENS
INCORPORATED
HOBOKEN NEW JERSEY



FORT ORANGE

One of the first to combine the manufacture of board with the production of finished cartons, our facilities serve the extensive needs of Government departments and industry under war conditions. We are prepared to offer our services to all industries at the return of peace.

FORT ORANGE PAPER COMPANY

Castleton on Hudson, N. Y.

475 FIFTH AVE., NEW YORK • Sales Offices • STATLER BLDG., BOSTON

THE SHAPE OF PEACE IN



THE HOLOCAUST OF WAR

Some of the products we have made to meet wartime shortages and stringencies may have a great future. Others may perish at the first ray of peace.

We raise no hosannas nor shed any tears for any particular package.

We are as anxious for peace as any human beings—and as businessmen, so we can put what ingenuity and resourcefulness we may possess back to work on the peacetime problems of the mass packagers of drugs, cosmetics, cigarettes and the like, who are our long-time customers.

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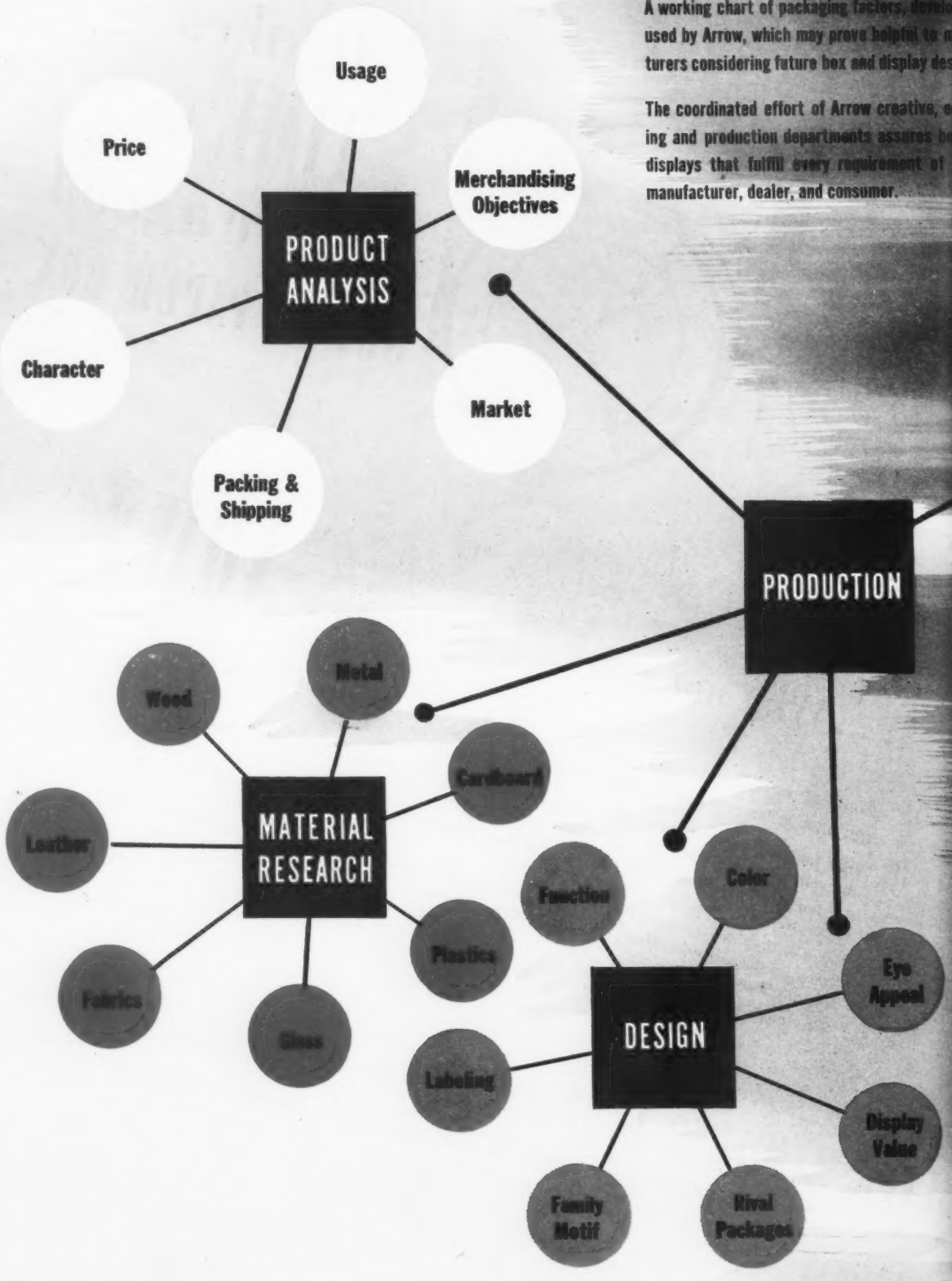
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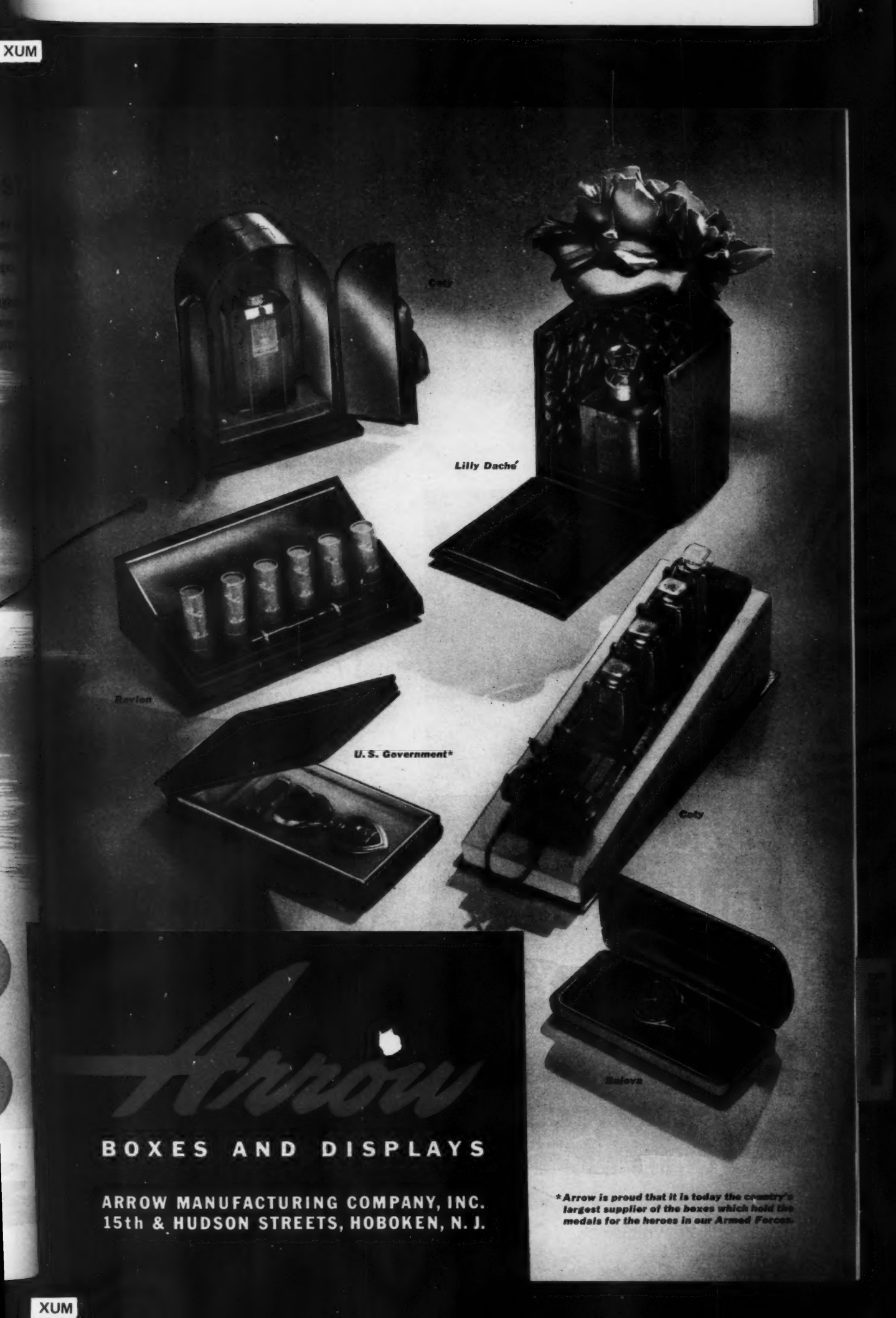
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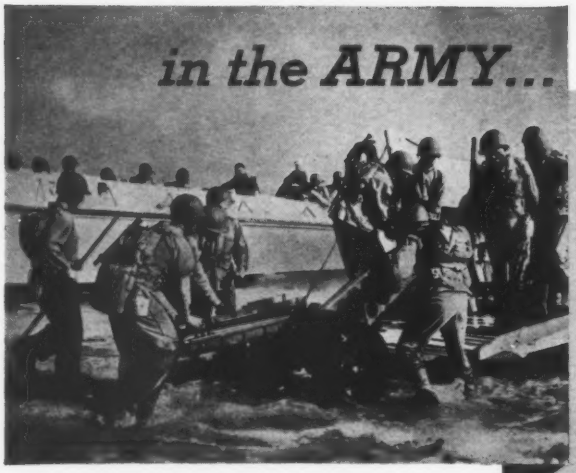
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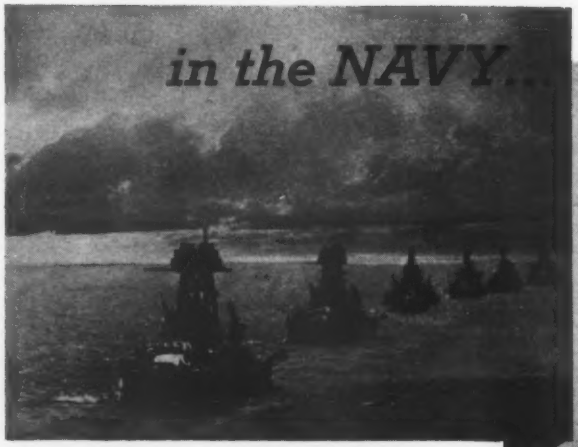
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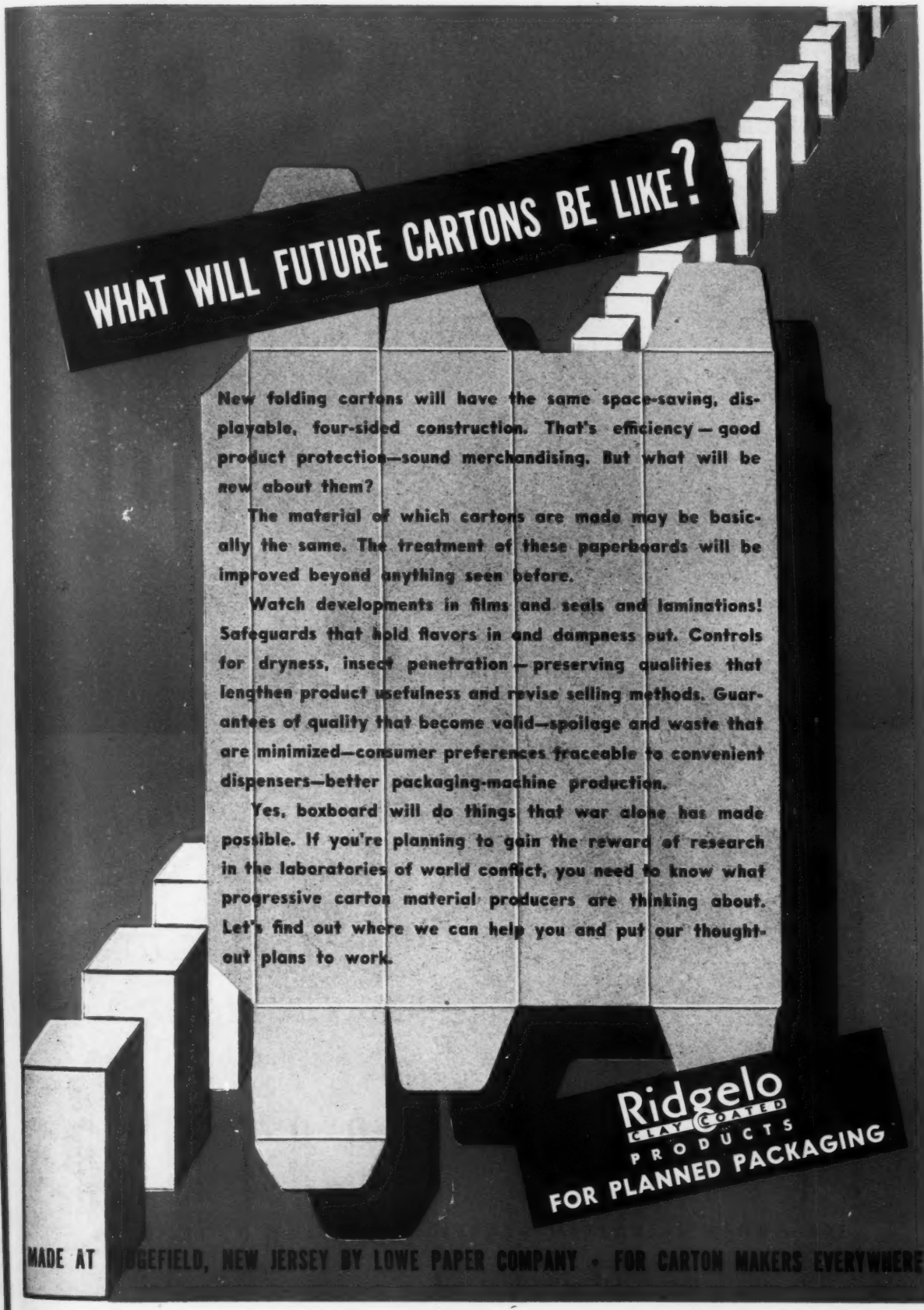
a cohesive market which is not an industry

Packaging's such a big market that it takes a big man to see it entire. • It is a market of industries: foods, drugs, cosmetics, hardware, etc., in which packaging is a key operation. • Packaging plants look *different: you will see in them machines that fill, pack, seal, carton. Inventories are pregnant with packages—cartons, boxes, jars, bottles, vials, barrels, cases, bags, sacks and others. • Some companies pack many different items, others go the whole hog on one. Most have entire departments including labs given to the economics, sociology, chemistry and physics of packaging. • In most of them you will find several packaging executives who read MODERN PACKAGING regularly. • These men and their companies form* a cohesive market which is not an industry, *but many industries with a common set of problems. • Their annual package purchase has been estimated at $4-$5 billion a year. Their problems are answered by a large group of supply industries of which yours may be one. • The largest suppliers are, in great part, advertisers in MODERN PACKAGING. This magazine has a measurable effect in keeping contact between them & the packaging field. MODERN PACKAGING might help you relate your goods & services with the broad problems of packagers.*

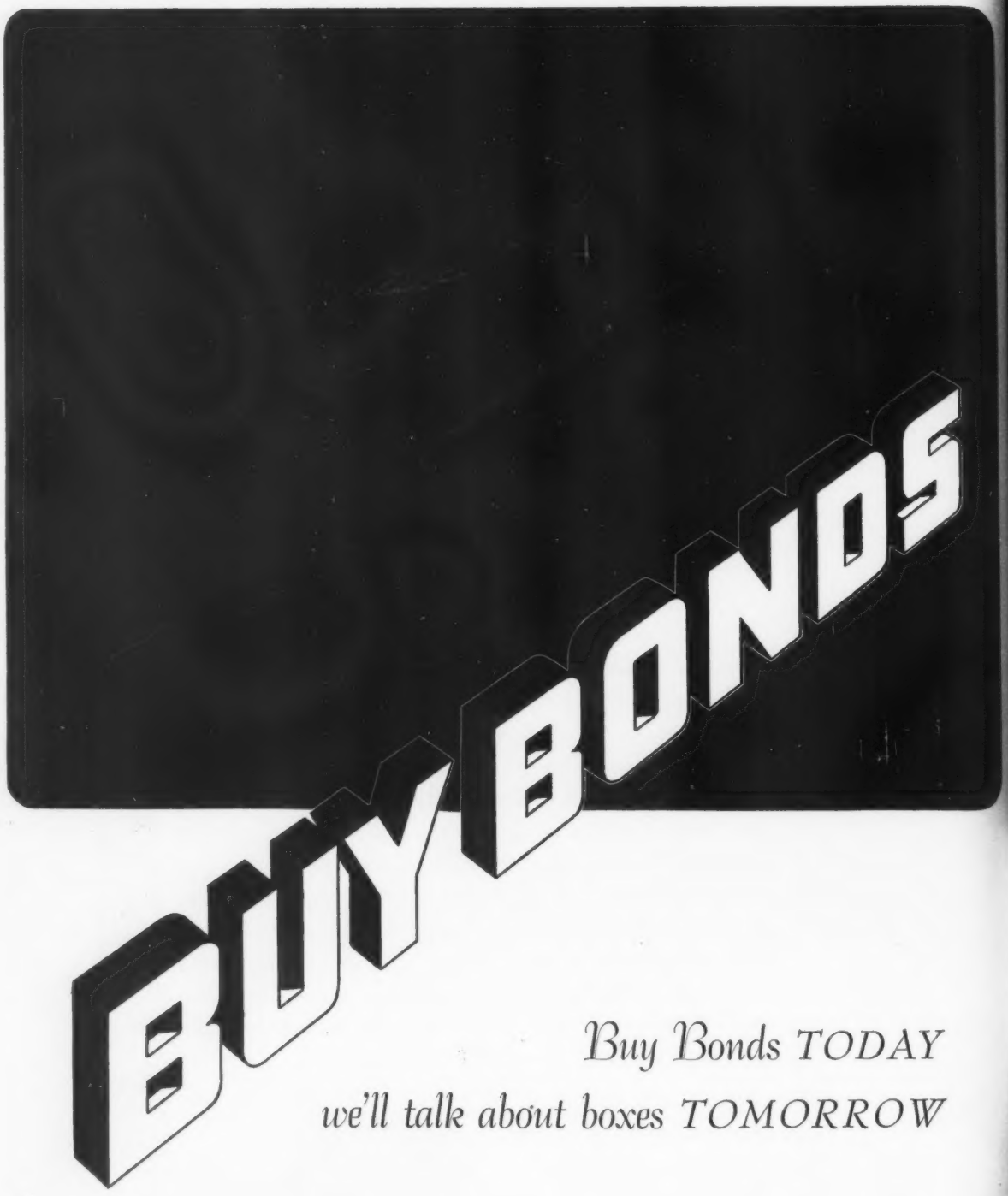
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MODERN PACKAGING MAGAZINE

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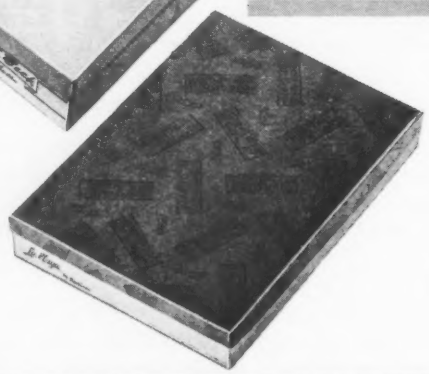
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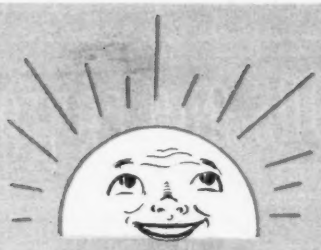
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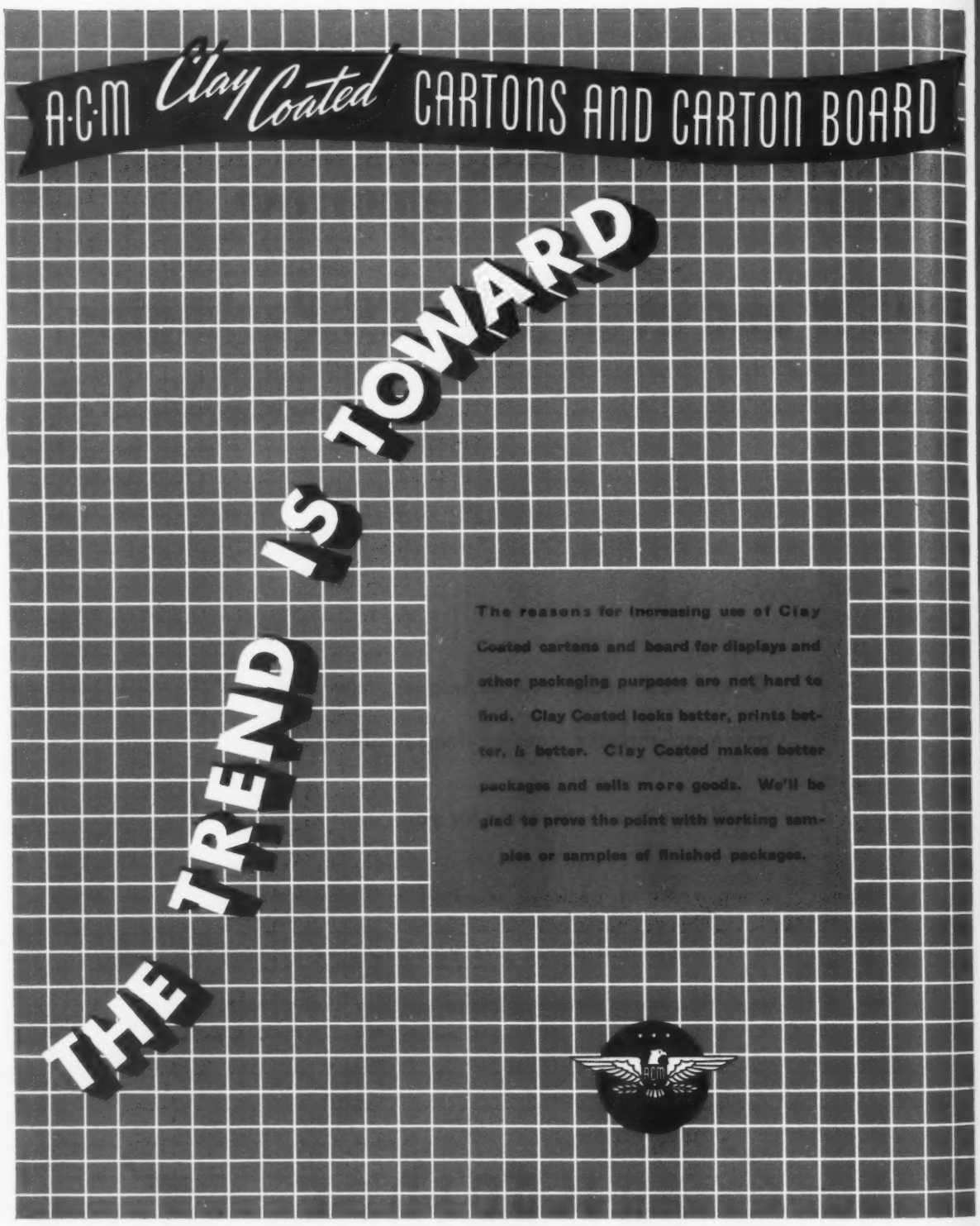
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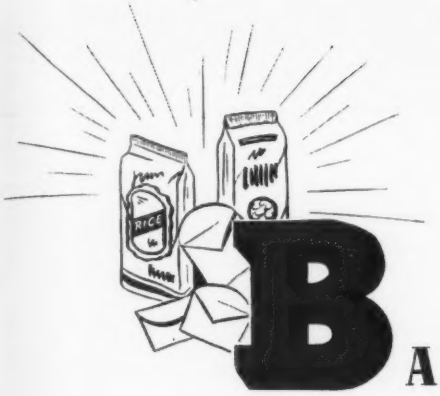


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BAGS–ENVELOPES–POUCHES

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Bag Sealing and Closing 185

Paper bags

The paper bag appeared in the field of packaging before the Civil War. Used first as a convenient and economical method of carrying items from store to home, it takes its place today along with glass jars, tin cans and cardboard cartons as a basic material in modern packaging.

Some of the reasons for the increasing importance of the paper bag in recent years in packaging are:

1. Automatic packaging machinery has been developed for the filling and sealing of paper bags.
2. Methods of heat-sealing for paper bags have provided a tighter seal.
3. Better protective papers have been made available for paper bags.
4. Protective coatings have been introduced to make paper bags more efficient.
5. Better designing and printing have given the paper bag more shelf appeal.

The present scarcity of tin, burlap, foil and other packaging materials has brought about the use of paper bags for a large number of products formerly packaged in other types of containers. Lend-Lease and military shipments include bags of almost every type from small envelopes for lemon drinks to heavy-duty bags carrying 100 lbs. or more of chemicals or foods. Bags-in-cartons have made possible many conversions from metal packaging to paper.

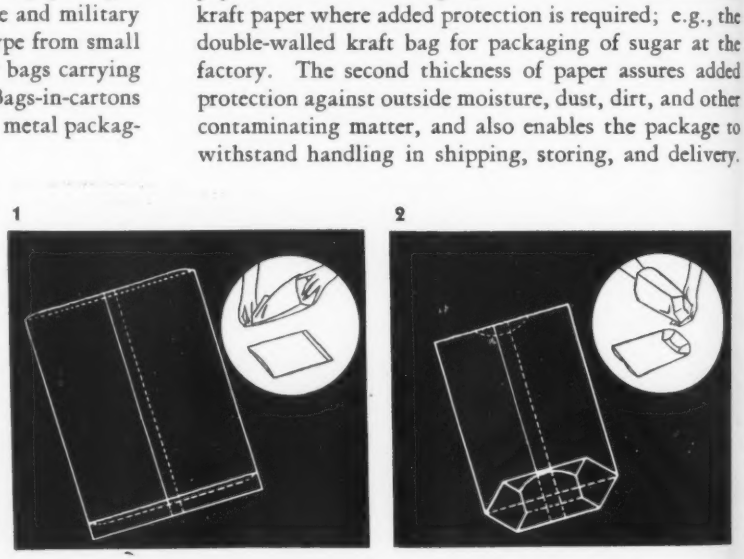
At first thought, "bag" ordinarily connotes the brown paper bag which is used by every corner grocer, but this does not properly fall into the formal classification of paper packaging. Better examples of the latter are the bags used for coffee, flour, sugar, potatoes, rice.

The definition of paper packaging comprises those paper bags that are filled and sealed in quantity before they reach the point of retail sale. The filling and sealing may be done at the factory, refinery or roasting plant, or by the grower, receiver or wholesaler. When the paper packages reach the retail outlet, they are stored, displayed, and sold to consumers as a complete unit.

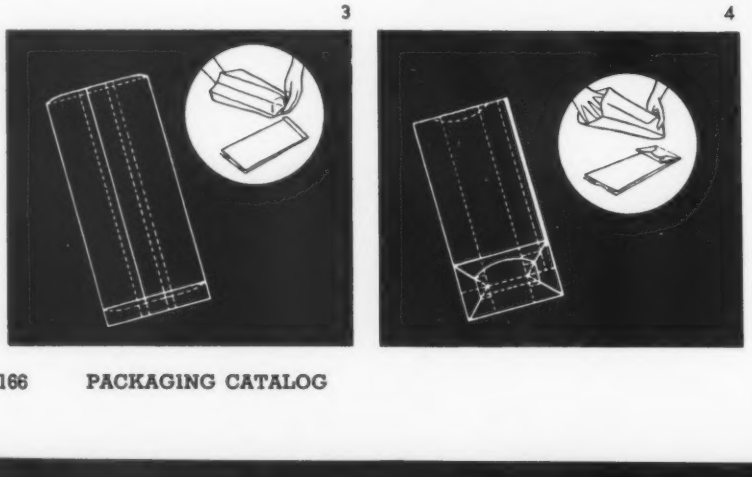
There are four basic types of paper bags, all of which are illustrated on this page. Whether used for packaging or wrapping, paper bags fit into one or more of these classifications.

Variety of papers available

A variety of papers is available for bags according to the requirements of the product to be packaged. Kraft papers are used for strength, with a double thickness of kraft paper where added protection is required; e.g., the double-walled kraft bag for packaging of sugar at the factory. The second thickness of paper assures added protection against outside moisture, dust, dirt, and other contaminating matter, and also enables the package to withstand handling in shipping, storing, and delivery.



Four basic constructions of packaging bags: 1. Flat bags were first type developed, simplest in construction, cheapest to make. They have a lengthwise seam, the bottom is simply folded under and pasted. Many variations are available. 2. The satchel-bottom bag has a bottom construction which, filled, provides a flat base. Resembling a traveling bag, it is roomy, makes a neat package.



3. Square bags have folded bottoms similar to flat bags. Bellows folds at the sides reduce width of closed bag without reducing capacity. Good for high-speed production. 4. Automatic self-opening bags are the last word in bag making, combine desirable features of previous types. Note bellows fold, improved bottom. Filled, it makes a neat, squared-up package with stable base, center or side seam.



5. ***Paper bags for packaging are usually defined as those filled and sealed in quantity before they reach the point of sale. Best examples are those used for coffee, sugar, flour, potatoes, beverages, etc. Photos Union Bag & Paper Corp.***

Where the product contains oils which would seep through paper, an inner protective liner of glassine is often used. Examples are the bags used for coffee, to prevent oils from coffee coming through the outside paper and bags used for salted nuts. Waxed paper liners are used in other cases to prevent grease or moisture from finding its way out of the package.

Where especially greasy products are to be packaged, a parchment paper is often used. Lard is packaged in such a bag; so is sausage meat. Many other combinations of papers are available to meet particular conditions. A study of the conditions of packing, storage, shipping, and handling will determine the paper or combination used.

There are laminated combinations today to provide protective barriers to meet the requirements of practically any product that can be distributed in bags.

Large size multi-walled bags are used as shipping containers for many products; e.g., coffee, sugar, and rice. The individual units for consumers are packed in these paper shipping containers for bulk shipments. In the case of sugar, 60 lbs. are packed in units of twelve 5-lb. packages, six 10-lb. packages, or thirty 2-lb. packages. Shipping containers for coffee hold 24 1-lb. bags.

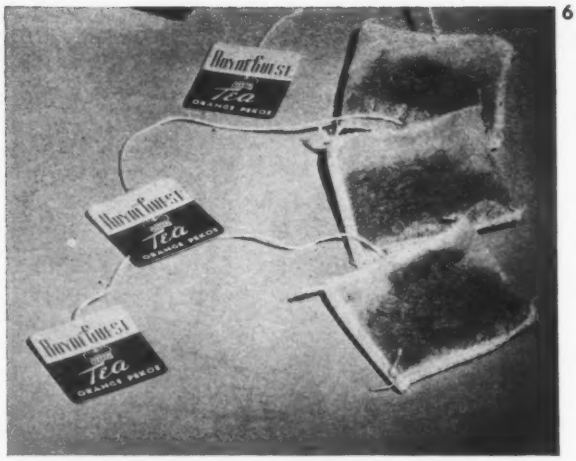
Paper bags are widely used as a wrapping material, in retail establishments, where individual purchases are placed in the bag so they can be carried home conveniently. Usually the only closure is formed by folding over the top of the bag. Some of the familiar forms used in this manner are:

Grocery bags (you carry your supplies in them)
Paper sacks (used in the super-markets)
Notion bags (for flat, small objects)
Millinery bags (same shape, larger size, for hats)
Garment bags (used by dry cleaners)
Liquor bottle bags (long and narrow to fit bottles)
Candy bags (used in every candy store)
Bread bags (just fits a loaf of bread)
Window bags (with a transparent window)
Shopping bags (large, of heavy kraft, with satchel-bottom and twisted paper handles, for carrying)
Beverage bags (short, automatic, with twisted paper handles, for bottles of soft drinks)
Bru bags (automatic, heavy, moisture-repellent kraft for wrapping products taken from refrigerators)
Nail bags (automatic, heavy kraft, shorter than grocery bags, used for nails in bulk and other hardware)

So many types of bags may be manufactured on special order that it is impossible to include a listing of all of them. A few examples, however, will give an idea of their wide application.

Tarnish protection—Anti-tarnish papers of many kinds (i.e., papers formulated to be free of sulphur) are being made into flat bags of many sizes to provide protection for individual tarnishable items and are being used extensively for packing silverware. This development is a progressive step over the former use of these materials as wrappings. The use of anti-tarnish bags provides a neater and more lasting protection and is therefore desirable because it makes many products more readily identifiable and salable.

Cotton-lined bags—To protect delicate surfaces of mirrors, china, and glass, and to protect silverware from



6

6. Tea bags of fibrous paper. Photo National Urn Bag Co.

tarnish, excellent cotton-lined bags have been made available during the last few years. The cotton is first bonded to paper and the completed padded sheeting is then worked into bag shapes, usually with sewn edges.

Automatic bag with transparent panel—To provide appeal of visibility for a variety of products, automatic bags are made with a panel of cellophane the entire length of the bag. However, such containers are highly restricted during this period due to the limitations on the use of cellophane and shortage of labor and manufacturing facilities.

Over-size and odd shapes—For unusual shapes—a long narrow bag for an umbrella, a huge cellophane bag in which to display a grand piano or an automobile—certain companies are equipped to fill the order.

Sample mailing bag—Many small bags of various materials are now being made as direct mail pieces for samples, promotional stunts, etc. These have a mailing card attached to the bottom, carrying the advertising or promotional copy and a space for name and address.

The user of bags today must study his requirements carefully. There are three important considerations in making selections: First, to decide what type of paper or laminations of paper with other materials will give the required protection for the job to be done. Second, to determine whether such materials are available if the product to be packaged is for civilian distribution. Third, to study carefully the government directives concerning the supply of bags and paper supplies.

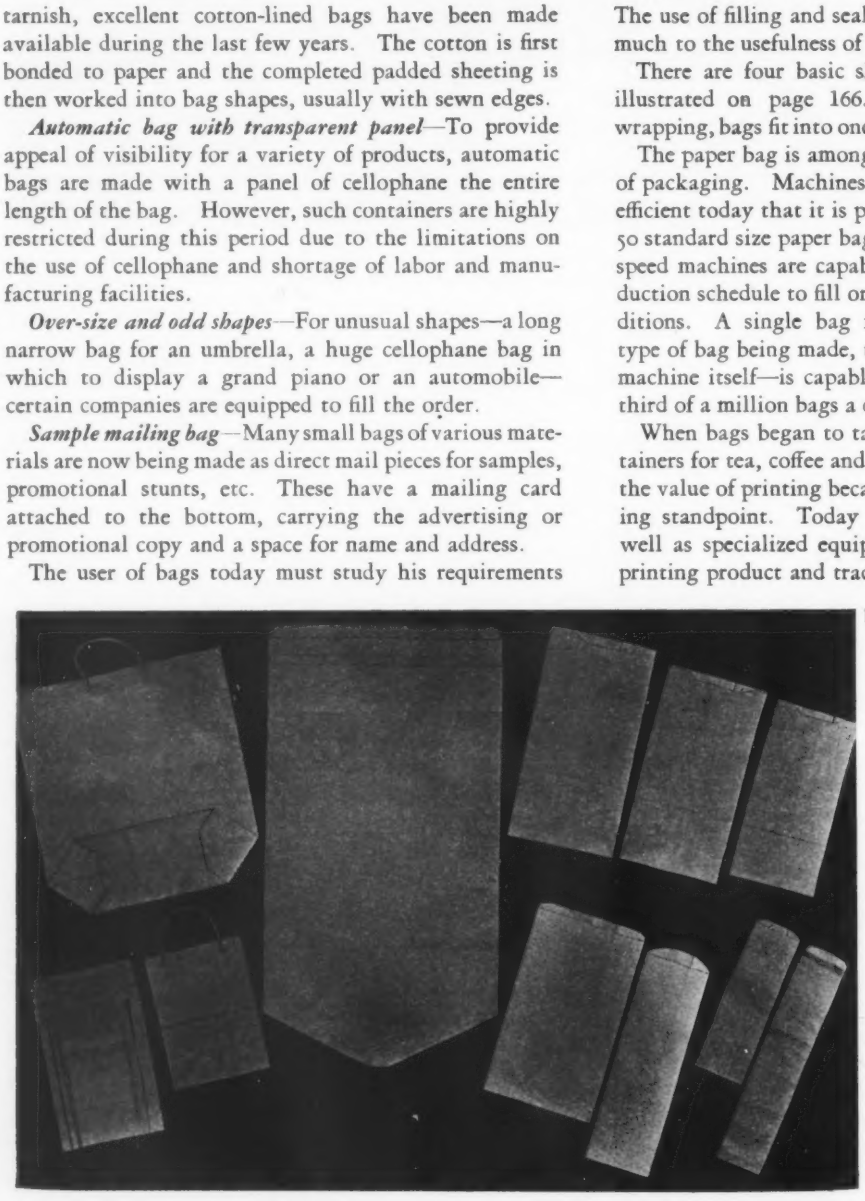
There are not only restrictions on paper materials used for bags, but on the various resins for adhesives and sealing compounds as well as shortages of metal for closures. Such limitations may completely change the type of materials to be selected. A careful study of the sections in this book on papers, laminations and government orders will be advisable before going too far with packaging plans during the war period.

Methods of filling and sealing paper packages are outlined in another section of this book (see page 185). The use of filling and sealing machinery has contributed much to the usefulness of paper as a packaging material.

There are four basic shapes of paper bags. Each is illustrated on page 166. Whether for packaging or wrapping, bags fit into one or more of these classifications.

The paper bag is among the most economical methods of packaging. Machines for making bags are so highly efficient today that it is possible to buy as many as 30 to 50 standard size paper bags for one cent. Modern high-speed machines are capable of meeting almost any production schedule to fill orders quickly under normal conditions. A single bag machine—depending upon the type of bag being made, the grade of paper used and the machine itself—is capable of turning out in excess of a third of a million bags a day, ten every second.

When bags began to take their place as standard containers for tea, coffee and spices and other food products, the value of printing became important from an advertising standpoint. Today practical printing processes as well as specialized equipment have been developed for printing product and trade identification on bags.



7

7. Paper bags used by retailers. Top, left to right: the shopping bag with twisted paper handles, garment bag, bru bags of moisture-repellent kraft. Bottom, left to right: nail bags, beverage bags with carrying handles, bread bags, narrow liquor-bottle bags. Photo Southern Kraft Corp.

Specialty flexible containers

by Gordon Friend

The specialty flexible container is a highly specialized form of bag or envelope, but it has earned a place for itself in packaging for two reasons: it performs an important protective and merchandising function, and it utilizes many and varied types of materials—particularly those recently developed. There is obviously some overlapping of this subject with the articles which precede and follow it, but the purpose of this discussion is to point out features not included in those treatments.

Not many manufacturers of specialty flexible containers were in business 25 years ago. Despite the fact that some few of them do date as far back as the turn of the century, the majority in business today did not exist prior to 1920. The containers are used for foods, chemicals, textiles, tobacco and a host of other commodities and articles. They differ from ordinary bags and envelopes in that, in addition to being carriers, they are used as sales and shelf packages.

Decorative

As special containers and shelf packages, they are almost always printed in multicolor designs. Most houses have their own art department through which color sketches may be prepared to meet individual requirements. Many methods of printing may be used—letterpress, rotogravure, aniline and offset. The industry as a whole is particularly conscious of the value of printing and designing in packaging, and has made as much progress in that direction as in the actual manufacture of the containers.

Protective

However, important as printing and designing are, the real service the specialty bag and envelope industry renders to national packaging lies in the ability of its product to protect perishable commodities from becoming rancid, stale and otherwise losing their freshness and quality.

In order to produce such merchandise, the manufacturer of specialty flexible packages must first depend upon the films which he converts into bags and envelopes. The more moistureproof, greaseproof and airproof these films are, and the more they deflect the rays of the light, the better the containers will be.

Materials

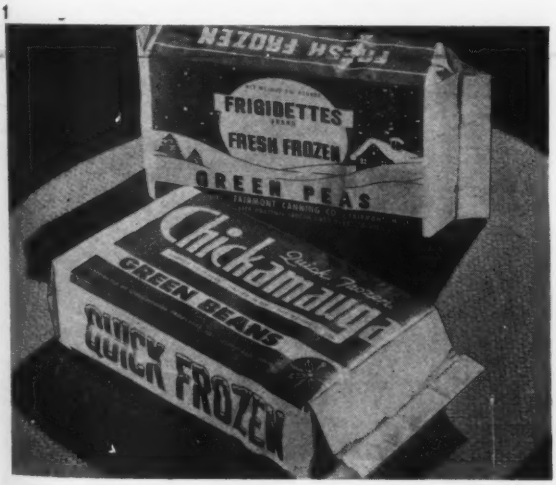
Prior to 1920, the specialty bag and envelope manufacturer had but few films at his disposal. The industry was limited by the fact that glassine, greaseproof parchment, dry wax and vegetable parchment were about the only papers then available. Since 1920, however, a great number of new films have been produced. They have greatly widened the scope of the specialty bag and the envelope manufacturer, and in truth, have been largely responsible for the growth of this industry.

Glassine manufacturers, by learning to coat their papers with special airproof and moistureproof coatings, or by laminating their papers with agents having the same properties, have done their share in expanding this industry. Manufacturers of various transparent cellulose films not only enabled the flexible packaging industry to produce bags and envelopes which preserve perishable products remarkably well, but in addition these films added the sales appeal of transparency to the other advantages of specialty flexible containers.

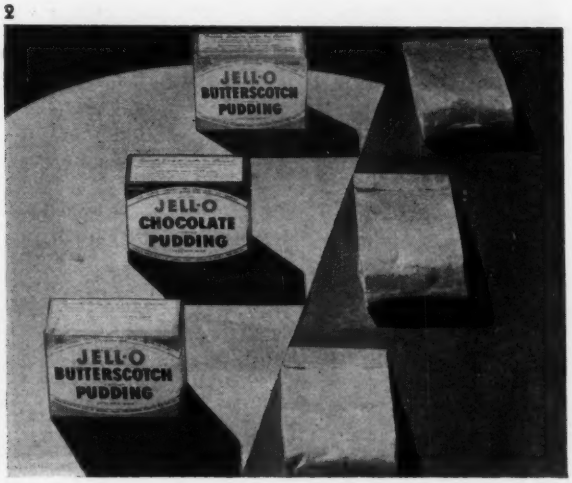
To the list can be added metal films (mounted and unmounted), new coatings, new laminations and many

1. A duplex bag, institutional size, for frozen foods which are kept under refrigeration until the moment of their consumption. 2. Dessert preparations are often packaged in specialty bags placed within boxes. Photos Benj. C. Betner Co.

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new plastics. The war, of course, has made many of these films and coatings unobtainable, but the research work and the production of these materials have not been stopped. After the war new films, new coatings and laminations will come on the market, offering widening fields and greater opportunities to the specialty bag manufacturer.

The specialty bag and envelope industry has made progress in perfecting new equipment to handle the variety of films. Thirty years ago it was considered a very difficult problem to manufacture and print bags made out of glassine paper. Fifteen years ago the industry had a hard time trying to make bags of cellophanes. Today the manufacturers of specialty bags and envelopes face the multiple problems of making containers out of many new films, new coatings and laminations. Now, however, backed up by proper research and long experience, progress goes on smoothly.

New techniques

One of the most interesting developments in the manufacture of flexible containers has been the art of making bags by means of heat sealing. It was found that if the seams in a bag were not securely cemented together, the package could not be airproof or moistureproof, no matter how good the films used might be. Heat was, therefore, used to weld together the seams of bags made from thermoplastic films, and the seams were far superior to those made with adhesives. Bags made from films which were not thermoplastic also could be printed at the joint areas with bands of thermoplastic materials and then be heat sealed.

The flexible container industry has also made a good record in its war effort. Thirty per cent of its production is for war use, and the remainder for critical civilian needs.

Flexible packages are used as containers for large airplane engines as well as for tiny doses of sulfanilamide. Army and Navy rations, medical supplies, gun powder charges, delicate instruments and metal parts, frozen and dehydrated foods—all these and many others are packed in specialty bags and envelopes for the armed forces. These war problems were tough, but were overcome by the work of Army and Government officials in cooperation with the industry.

The specialty flexible container industry, now large, will grow. In 1942 it consumed 125,000 tons of paper in addition to quantities of transparent and metal films.

For a long time there was a need for inexpensive packaging equipment to open, fill and close these containers. However, such equipment was coming out before the war, and in the postwar period many new machines will be available to packagers of foods and other products.

3. Specialty bags are made in sizes and shapes to suit product and merchandising plans. Photo Union Bag & Paper Co. 4. Die-cut envelope, heat sealed, for unit dosage. Photo Thomas M. Royal Co. 5. Individual serving of ready-to-use cereal in laminated opaque glassine bag. Photo Thomas M. Royal Co. 6. Foods for war export would have fared poorly without bags of kraft, glassine and other specialty materials. Photo Thomas M. Royal Co.

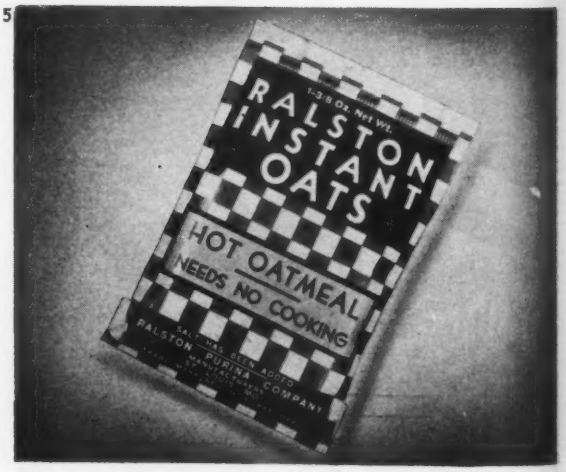
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Transparent bags

The transparent quality of any packaging material is a feature which, from its first introduction, proved its value. It is true that visibility has been misapplied in some cases, but certainly the transparent bag has to its credit an enviable utility record.

The growth of the use of transparent materials and the reduction in cost of producing such materials during the past decade have been most significant developments in the history of packaging. Endless possibilities have been opened up for the packaging of thousands of products heretofore sold in bulk.

Before the war, greatest emphasis was on the use of this material for its merchandising advantage of eye appeal. Now, and for the duration, its most important characteristic is its protective quality. Transparent materials for purely display purposes have been completely limited by government orders (see chart "Government Controls" opposite p. 24) but their uses for essential packaging have been increased manyfold as alternates for metal and other now scarce materials.

Aside from these restrictive measures there are practically no limitations on the applications for transparent bags except those set by the size, shape, weight, fluidity or other characteristic peculiar to the product to be packaged.

Among the most commonly used materials for transparent bags is cellophane. This completely transparent sheeting is lustrous, durable, flexible and impervious to air, grease and dirt. Bags made of this material and the characteristics of each are as follows:

Plain transparent (P.T.)—Products *not* affected by moisture may be packaged in plain transparent cellophane bags, usually designated as P.T. Such products include in normal times a long list of fruits and vegetables, candies, apparel accessories, dry goods, soaps, stationery, noodles, popcorn, moth balls, spices, seeds.

Moistureproof transparent (M.T.)—All products that should retain moisture or be protected from atmospheric conditions, require the protection of moistureproof cellophane bags, designated as M.T. Such products include perishable foods, Army rations and medical supplies, metal items that are subject to corrosion, etc.

Moistureproof heat sealing (M.S.T.)—Bags made of cellophane with heat-sealing qualities inherent in the sheet. This mateial can be sealed to itself without the use of adhesives by the application of heat.

Moistureproof heat sealing, anchored (M.S.A.T.)—Cellophane bags made of material designated M.S.A.T. provide greater moisture protection than those made of M.S.T. cellophane. This material is designated as "anchored" because of the process by which the coating is applied. It is used widely for frozen food bags.

Color—Cellophane bags are available in eight colors: red, green, blue, pink, orange, amber, orchid and violet.

Printing—Transparent cellophane bags may be printed by letter-press, aniline, or gravure, in one to six colors, by means of type set-ups, zincs, halftones, or process plates. (One company prints up to seven colors by gravure.)

Either the inside or outside of the walls of the bag may be printed. Printing on the inside of the film known

1. Semi-transparent films are now doing duty for war-scarce transparent materials. While the function of these bags is primarily to protect the product, the material also contributes visibility to the package. Photo Thomas M. Royal & Co.







2. Laminated cellophane heat-sealing bags hold individual servings of hygroscopic dehydrated soup ingredients. Six bags are placed in carton with noodles. Photo Benj. C. Betner Co. 3. Shelf life of perishables is extended by use of cellophane which also permits product to make its own appeal. 4. Opaque or translucent envelopes for dehydrated soups have replaced metal foil during wartime.



as reverse printing is used when a brilliant effect is desired and when there is no possibility of the printing inks affecting the packaged commodity. Duplex bags are usually printed in reverse on the inside of the outer wall.

Construction of bags

Cellophane bags are made in three standard styles: flat, square, and satchel bottom. (See page 166.)

Single or double wall—All three types of bags (above) may be obtained in either single or double wall (duplex) construction. Duplex bags are used for extra protection against shipping or handling hazards and where weight or bulk of the packaged commodity make necessary greater container strength. Specific protection requirements are met by having inside and outside walls of the bag made of different films. Cellophane bags used in the Army Ration K packages, for example, are two thicknesses of this transparent material.

Closures—Transparent bags may be closed by twisting, heat-sealing, crimping, stapling or with cellulose tape. Cardboard headers are often used, especially on plain bags, as part of the closure. They may carry the name and trade mark of the product, and often some promotional or required informative copy. Holes may be punched through the header so that the bags may be hung on special display racks.

Sizes of bags

Transparent bags may be made up to order in virtually any size in widths from $1\frac{1}{2}$ in. to 14 in. and in lengths from 3 in. to $17\frac{3}{4}$ in.

Unprinted bags are available in stock sizes which are fairly well established throughout the industry. The numbers by which the bags are designated indicate their nominal capacity, but it is obvious that the capacity of the bag varies with the bulk of the product to be packed.

1. Flat bags: 1-oz., $\frac{1}{4}$-lb., $\frac{1}{2}$-lb., 1-lb., and 2-lb. sizes, as well as in a size designated as *No. 1 Peanut* and designed to hold 1 oz. of nuts.
2. Square bags: same as above plus a 6-lb. size, and four special small sizes.
3. Satchel bottom bags: designated as $\frac{1}{4}$-lb., $\frac{1}{2}$-lb., and 1-, 2-, 3-, 4- or 5-lb.

Transparent bags may be filled by hand or by machinery. Granular products, such as sugar, small confections, seeds, etc., are loaded by the use of a hopper or a funnel-loading device. Many excellent automatic weighing and loading machines have been developed.

Glassine

Because of their semi-transparent quality, due to certain treatment in fabrication, paper bags made of glassine deserve an important place in this classification of transparent bags.

Bags of glassine are made in standard-type construction or in special types and are available in many sizes. They are used widely in many industries because of their excellent protective qualities.

Glassine bags are given their maximum degree of transparency and gloss, and their grease-proof, moisture-proof, and heat-sealing characteristics by means of lacquer and wax coatings.

Many of these lacquer-coated glassine bags are used extensively for the same purposes as cellophane, e.g., containers for potato chips, popcorn and small confections, which require a high degree of grease and moisture protection.

Waxed glassine bags used as liners for cartons are a mainstay in the manufacturing of cereals and crackers, because liners of this material assure long shelf life for these products and keep them fresh until they reach the home of the ultimate consumer.

Glassine takes attractive color printing in accurate register, and is strong enough to stand the strain of all stages of high-speed machine wrapping processes. It is available in several colors. If chlorine-bleached white papers should become scarce during the coming year, it is predicted that many packagers will turn to bright amber-colored glassine.

Because of the shortage of glassine paper, however, bags of this material have been limited for the packaging of such items as hosiery, lingerie, notions, hardware, etc.

Rubber hydrochloride

The present rubber situation has cut off entirely the possibility of using rubber hydrochloride sheeting for civilian packaging purposes. The makers of this material have announced that practically the entire production is now being used for making the bags in which airplane engines are protected against corrosion through the dehydration method during shipment to war zones.

In the field of transparent packaging, however, rubber hydrochloride sheeting offers many advantages which will be in great demand once the war is over.

This material is impervious to, and thus not affected by dilute acids, air, alkali, brine, grease, normal heat and cold, moisture, mold, oil, and water. In addition, it is dimensionally stable throughout the entire humidity range, durable, non-explosive, and inflammable only slowly and with great difficulty. It takes printing easily, has great tensile strength, shows good resistance to puncture, may be closed by heat-sealing, sewing, or adhesives.

Rubber hydrochloride sheeting is made in a crystal-clear transparent type as well as in a wide range of transparent and opaque colors. It is not a coated material but homogeneous; that is, the same substance throughout. Because of this fact, heat-sealing effects an actual fusion of the material and creates an air-tight bond stronger than either sheet. The moistureproof quality that keeps flavor inside and air outside, together with rapid, thorough sealing, has brought hundreds of flavor-sensitive products into the transparent packaging field. Special inks for printing the surfaces of rubber hydrochloride sheeting provide many opportunities for display.

The two most common types of bags made from rubber hydrochloride sheeting are the regulation flat and square (or gusset) forms. Open-end pouches, resembling a shortened satchel-bottom of the conventional type, are used for the packaging of soft or semi-solid products such as processed cheese. The open end is usually folded and sealed to form the completed package.

Rubber hydrochloride bags, laminated or otherwise, enclosed within paper containers have proved successful for the packaging of many products, notably coffee. Laminations of rubber hydrochloride sheeting with paper and foil are also used in bag form.

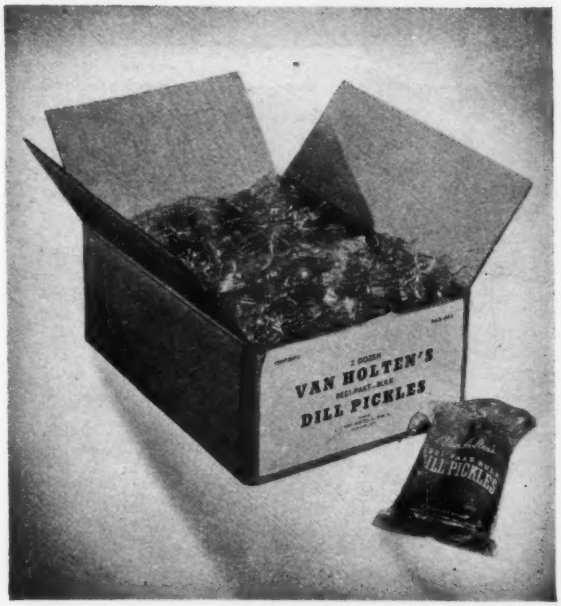
Because it is soft and durable and can be sewed, rubber derivative sheeting has opened a broad new field for economical yet distinctive re-use or "merchandise-container" packaging which will return after the war.

5. Small machinery parts are protected from grime and corrosion in small cellophane bags which allow easy identification. 6. Pliofilm, a liquid seal, now can package pickles in brine. Photo Goodyear Tire & Rubber Co., Inc.

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Metal-foil bags

The metal foils—aluminum, lead and tin—had established themselves as important packaging materials long prior to the era of shortages brought on by the war.

Only for the most essential military packaging are aluminum or lead foil allowed. Perhaps one of the most outstanding developments in wartime packaging is the flexible material made from lead foil, kraft paper, bond paper, asphaltic sealers, cellophane and thermoplastic adhesives which is now replacing all-metal cans for many military and Lend-Lease packages. This material worked into bags is used for bag-in-carton packs for 5 gal. of dehydrated vegetables, for waterproof match cases, for packets of sulfa drugs, for emergency rations on lifeboats, for plaster of Paris bandages.



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Similarly, many of the new packaging materials which have been developed to do substitute service are in laminated forms, making use of metal foils which contribute certain qualities to the composite film.

The metal foil bag consists of a thin sheet of shiny, flexible aluminum laminated to paper (glassine, greaseproof, bond, cellulose, etc.) and formed into a bag. The metallic surface is usually exposed and when this is printed in bright colors, it makes a package having powerful eye appeal on dealers' shelves.

Surpassing the value of the metal bag in eye appeal is its remarkable protective properties. Foremost among these protective features is the fact that the metal bag excludes light. Such products as potato chips and salted nuts, for example, are especially sensitive to light, only a few hours of exposure being sufficient to cause a photo-chemical reaction which results in rancidity.

A second important feature of the metal bag is its high resistance to the transmission of moisture. In one reported test, metal bags of potato chips, after four hours' continued exposure to saturated atmospheric conditions (95–100 per cent R. H.) at 100 deg. F., showed only 0.99 per cent absorption of moisture as compared with 18.7 per cent absorption by a non-metallic bag under identical conditions. Metal bags also resist insect infestation.

Metal bags are made in both the square type and flat type and both are available in the duplex style, that is, with liner of glassine, parchment, or other papers.

The bags are used either inside an outer paper carton or can, in which case they are unprinted; or as a single container when they are printed in one or more colors.

Heat-sealed metal envelopes are being sold in increasing quantities for the packaging of dehydrated soups, vegetables and fruits. The metal bag with its protective qualities and eye appeal is especially adapted to the packaging and marketing of dehydrated products.

Aluminum and lead are in better supply than they were at the beginning of the emergency, while tin remains on the highly critical list and is likely to be there for some time. But it is safe to predict that the postwar period will witness the return of metal foils to many of their former uses. The metal-producing companies and the package fabricators are devoting considerable research to packaging problems for future needs.

1. Military packages with inner bags of metal-foil laminations now replace all-metal containers. Photo Reynolds Metals Co. 2. Anticipating postwar needs, here are suggested designs for bags made of laminated foil which tests out as suitable packaging material for small units of various foods, drugs and chemicals. Photo The Dobeckmun Co.

Merchandise envelopes & packets

In the bag man's vocabulary, a flat bag becomes an envelope when its ends are die-cut instead of serrated, to give shape to the flaps. Such containers protect the product and safeguard its identity; provide a convenient unit to dispense small quantities. Merchandise envelopes and packets package such products as:

1. Individual portions of, e.g., powdered chocolate for hot drinks at soda fountains, soluble coffee, etc.
2. Small quantities of seeds, drug products, minute watch parts, phonograph needles, etc.
3. Small quantities of powdery substances, which must be completely enclosed to prevent sifting.
4. Flat objects of light weight, such as hosiery, gloves, collars, dress patterns, notions, fishing flies, etc.
5. Samples distributed for promotional purposes.

In size they vary from tiny $^4/_6$ in. by 1 in. envelopes with a center seam, for minute watch parts, to $7^1/_2$ in. by $10^1/_2$ in. envelopes of general utility.

Merchandise envelopes offer more than a convenient and economical method of packaging the products listed above. They can be made of many types of papers, transparent sheetings and laminated films and offer all the possibilities of color printing and pictorial presentations.

An interesting case of a dual purpose envelope is one used by a manufacturer of edible dyes. One side of the envelope tells the Easter color egg story. When Easter is past, the other side of the envelope gives the story of food coloring for cakes, cookies, ices, etc.

Utility functions, too, are performed by merchandise envelopes. At hand is the case of a manufacturer of automobile piston rings. As any automobile mechanic knows, the proper piston ring in the correct groove when "re-ringing" an automobile engine is vitally important for maximum performance. This manufacturer used identifying colors on the edge of his envelope.

1. Merchandise envelopes in war service have proved to be safe and sterile containers for medical supplies. Photo U. S. Envelope Co. 2. Individual envelopes protect piston rings from corrosion and guarantee right ring in proper groove. Back of envelope gives full directions. 3. Envelope containing food colors fits its sales message to the Easter season. Photos Cupples-Hesse Corp.

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Textile bags

Bags carry more of the world's goods than any other type of container and among the oldest types of bags are those made of textiles.

Generally speaking, there are four kinds of textile bags—burlap, cotton, cotton or burlap in combination with paper, woven paper.

Burlap bags for strength

Burlap bags are one of the cheapest and most durable packages that can be chosen for bulk shipment of dry materials. Burlap is made from jute which is grown in India. (Not to be confused with the same word denoting scrap in paperboard making.) Jute is the fibrous part of a plant which grows from 5 to 15 ft. high. The fibres are located between the outer covering or bark and the stalk of the plant. To remove them from the stalk, they are immersed in water from 8 to 80 days.

The cloth is woven in a variety of constructions and is finished in several different ways. Jute, however, is a coarser fiber than cotton and therefore does not make as uniform a product. The products of each burlap mill in India are inspected and tested each year in normal times by a representative of one of the large bag manufacturers in coöperation with other companies in the industry and quality classifications are issued dividing all jute mills of India into four groups, A, B, C and D. This grouping is based on certain factors found to be present, such as weaving defects, short yardage, wrinkled and folded ends. This mill grouping is used as a quality guide.

The weight of the burlap, the twist of the yarn and the manner of weaving are chief elements in the strength of the cloth. The size and twist of the threads and the number of threads woven in a given distance determine the weight of the cloth. Jute weavers call the threads that run the length of the cloth or warp threads, "the porter," and the threads that run at right angles or filling threads, the "shot." The number of threads per unit of measure in the "porter" and in the "shot" is called the count. The count, thus, to a greater extent determines the strength of the cloth.

Burlap bags are used where strength is paramount and appearance is not so essential. They are usually used when comparatively large amounts of a product are to be packed in one unit. Burlap bags may hold 200 to 225 lbs., although modern practice is to use the 100-lb. size which can be easily handled by one man.

Cotton bags for appearance

Cotton bags are more generally used where appearance and cleanliness are important. Up to 1900, cotton goods for use in bag making were produced largely in New England mills, but since that time there has been a gradual migration of these mills to Southern states.

Through research, improved equipment and increased efficiency considerable progress has been made in standardization, consistency of quality and finish of cloth.

Constructions for 100-lb. cotton containers as well as liners are usually confined to a limited number of widths, such as 30, 31, 32, 36 and 40 in. in styles known as sheetings, drills and osnaburgs.

Sheeting styles are classified by yards per pound, such as 36 in., 4 yards per lb.; 36 in., 2.85 yards per lb.;



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1. Millions of textile bags have been required for the protection of gun emplacements in military operations, and millions have been used for the protection of civilian lives and of property against air raids. Photo Press Association.

40 in., 2.85 yards per lb. They are generally made with 48 warp and filling threads per inch each way. Some constructions are bleached, clay sized and calendered to provide protection for the product, to prevent sifting and to give a better appearance and printing surface.

Drills, which are a herringbone weave, are used relatively little for containers and principally for bags under 100 lbs. where added sifting protection is required. These constructions are made in 30-in. and 36-in. widths, with warp and filling counts 70 by 48 in. and the weights 2 to 3 yards per pound.

Osnaburg is a coarse, heavy-duty cotton fabric made in medium and heavy weights. The heavier weights are described in ounces per yard rather than in yards per pound. The principal heavy weight constructions are 30 in. and 36 in. at 7 oz. per yard and 40 in. at 7 and 8 oz. per yard. These are used for such products as cement, chemicals, fertilizer and other heavy materials.

Lighter weight osnaburgs such as 36- and 40-in. widths weighing 3.50 yards to the pound are used for coarse materials such as feed, salt, etc.

Seamless cotton bags are made from cotton woven in the form of tubing. They are excellent for multiple-trip or heavy duty service. They are made in 1, 2 and $2^1/_2$ bushel capacities for shipments of grain, beans, seeds, flour, sugar, etc.

Combinations for versatility

Combination bags of textiles and paper were devised by bag manufacturers to broaden the use of their containers for products which ordinarily would be unsuited to a textile bag such as calcium chloride, alum, copper sulphate, sodium hyposulphite, dyes, paint pigments and insecticides.

Some powdered products sift even when packed in bags made of very closely woven cloth. Other products absorb moisture or give off moisture and therefore must be given more protection from the atmosphere than can be provided by textiles alone. Other products must be kept free from contamination.

Liners

Loose liners, today, fall into two classifications—the single-stretch and the double-stretch type. Single-stretch liners have about 33 per cent stretch around the width of the bag but no stretch in length. Double-stretch liners have approximately 33 per cent stretch in both directions. The stretch feature, aside from the care exercised in insertion, filling and closing the container, has more bearing on the performance of the liner than any other item. To avoid placing strains on the liner, its minimum stretch must equal the stretch of the outer textile bag in every direction. Liners have been treated with various coatings and impregnations to incorporate into them resistance to transmission of moisture and grease.

The efficiency of the loose liner, however, is dependent on the care with which it is handled. The fit of the liner must first be most carefully determined. The way it is inserted into the outer textile bag is likewise a very important operation. This must be done so there will be no strains exerted on any part of the liners when the bags are filled. Special attention must be given to the closing of the outer bags and the liners. Liners should always be closed separately from the outer bags, because any closure of the outer bags which includes the liner is likely to cause strains and breakage.



2. Open storage of grain in textile bags. This special method of stacking protects contents from the elements.

A development during the past fifteen years is the textile bag with attached or laminated paper liner. This unit has many advantages in that it can be handled as a single unit. It consists of an outer textile bag with a paper liner containing stretch in all directions. The liner is attached to the burlap or cotton with an adhesive. This type of liner is known in the trade as W.P.-P.L. (waterproof paper lined).

Adhesives

Asphaltic cements are the most common type of adhesive used to bind the paper to the fabric because they are more moisture resistant than most other adhesives. Much progress has been made in the use of various types and kinds of asphalts to overcome brittleness at low temperatures and softening at high temperatures. The use of other materials with asphalt have also been found to give the results which are required under special conditions.

Rubber latex was being used as the adhesive between the outer burlap and the first paper lining before the war, but such development has been retarded due to the wartime rubber situation. Right now some extensive experiments are being conducted with the use of vinyl and other plastic resins as laminants and seam-sealing compounds which are expected to mean great progress in this field in the very near future.

The weakest points of any container in connection with waterproofing are at the seams. A recent development in bag making is the use of cemented seams instead of stitching. Means are also being provided for heat sealing the bag after it is filled to produce a highly moistureproof sealed container. Other developments make





3. Open-mesh bags replace crates and boxes for one crop.
4. Small cloth bags package machine parts for the war.

use of pressure-sensitive tapes for reinforcement of seams and closures.

Methods of closing

The methods of closing textile bags are as follows:

1. ***Machine sewing*** is found advantageous for volume production. After passing the filling spout the bags move by conveyor to a sewing machine through which they are hand guided. The usual stitch used is the double-locked stitch. Regular practice is to use four stitches per inch, except in cases for finely powdered materials, where a closer stitch is efficient. To close 100 bags 19 in. in width there are required 464 yards or 0.2303 lb. of 5-ply No. 12 thread in the needle and looper of a sewing head. This is an example of how twine closure costs may be estimated. One of the large bag manufacturers furnishes a table so that bag users may know how much sewing thread is required for any particular size of bag.
2. ***Hand sewing*** is usually done with a large needle made especially for bag closing. A loop stitch is usually used over the rolled bag mouth, forming ears at each end.
3. ***The wire tie*** is also a hand method. The mouth of the bag is gathered and twisted slightly. Then a piece of malleable wire looped at both ends is applied with a hand twisting tool.
4. ***Tape sealing and heat sealing.*** The use of cementing tape over the mouth of bags with attached liners made of laminated materials to effect a closure is now coming into wider usage. It may not be long before a heat-sealing operation is perfected for these types of containers.

An important consideration in closing textile bags is the amount of spill room allowed. A bag does not resist severe drops or shocks unless there is some space for the load to shift. This is a feature of hand sewing to be carefully watched, since the bag sewer may not always allow for sufficient spill room. As a general rule there should be a minimum of $^1/_2$ in. and preferably 1 to 2 in. from the level of the contents to the closure. This measurement should be taken with the bag standing on its butt and both walls of the bag brought together, pressing on the top of the contents. The closure should then be $^1/_2$ in. above the point where the center of the walls of the bag meet and contact with the contents. More spill room should be allowed in a 100-lb. bag than in smaller sizes, as the stresses and strains are greater in the larger package.

Specifications for bags

Textile bags are almost always custom made for the product to be packed. Before the proper bag or bag with liner or lamination may be recommended for a new product such factors must be determined as: (1) fineness of the product, (2) its flowing qualities, (3) weight per cubic foot, loose or settled, (4) percentage of moisture contained, (5) required protection against moisture loss, (6) hygroscopic or deliquescent properties, (7) chemical action on fabric or paper, (8) type of package now used, (9) filling, weighing, closing methods, (10) where and how it is shipped (rail, truck, air, steamship, etc.) (11) how it is handled, (12) storage conditions, etc.

Only when these properties of the product and handling conditions the package will undergo are known, can a bag of the proper tensile strength with the proper protective features be selected. Preliminary tests are usually made in the bag testing laboratory approximating all conditions of handling, storage and end use. To assure satisfactory packages it is also wise to make several actual shipping tests.

Laboratory tests for ruggedness or strength are usually made in the form of a drop test. Standard number of flat drops (landing on face of bag) are usually determined from a height of from 4 to 10 feet depending upon the service the bag must withstand. This is combined with a standard number of butt drops (landing on ends of bag) from a height of 2 to 5 feet. Dropping by apparatus is recommended, since dropping by hand is not likely to be accurate for a determined number of test drops.

Bags may be tested for loss through sifting by weighing before and after drop tests and also by tumbling tests. Special apparatus is available for such purpose. In modern usage, bags may be submitted to severe submersion tests, temperature tests, puncture tests.

Another recent development is the treatment of textiles with mildewproofing agents to prevent deterioration of the bags in actual use. Extensive tests have been made in this field for sandbags used by the armed forces.

A technical committee of the Textile Bag Mfgrs. Assn. is at work constantly with the Government in working out specifications for all the textile and textile combination bags that are being used for hundreds of products shipped by Army, Navy and Lend-Lease. All of these must meet rigid tests for what they are designed to carry.

Bag handling

In addition to the proper selection of textile bag, the proper handling of these containers is an essential part of their successful use. Prior to the war, the Assn. of American Railroads gave a great deal of attention and study to the subject of proper loading of textile bags. Rules have been set down for preparing cars for loading—to have them carefully cleaned, all protruding nails removed, and bolts and other sharp edges covered with pads. There are also special instructions in loading to prevent friction of bags with car walls, and to prevent shifting in transit. This method of loading, known as the Key Sack Method, was said to have reduced claims on flour shipments from $250,000 to $38,000 a year. Users are also cautioned against using hooks or other loading devices definitely not suitable for this type of container.

Re-use

Textile bags are an important wartime container because of their re-use possibilities. Because of this salvage value, the manner in which they are opened is extremely important. If the tops are cut or have holes in them their value as re-use is likely to be zero. To open a bag tied at the top with twine it is simply necessary to cut the twine without cutting the cloth. A bag tied with a wire tie can be opened by untwisting the wire by hand. A hand-sewn bag is opened by cutting the twine and pulling it out. Bags sewn by machine can easily be opened without damage as a chain stitch is used so that if the two ends of the twine are pulled the stitches will unravel readily. In normal times second-hand bags go largely into certain definite channels, but in these times when production schedules are loaded to capacity and the supply is short of the demand careful salvaging of every bag is one of the best ways to augment the supply. An example of the re-use value of textile bags is the cotton seamless bag. This is a strong rugged container, designed for multiple-trip use. It may be used for 20 or 30 trips and is often employed for inter-branch shipments.

Few people think of the re-use feature of a textile bag as a premium feature like a tumbler for cheese, a cookie jar package for crackers, a fancy cake box for fruit cake. Nevertheless it is estimated that 3,000,000 women and children are wearing clothes made from flour and feed bags. Such bags are made from gingham which the manufacturer has had printed with dress patterns. His trademark washes off, so that no one who sees a dress made from such material could tell that it was made from a feed bag. Two or three of these 39- by 42-in. feed bags provide enough material to make a dress for the most stylish stout. In 1941 bag manufacturers were turning out approximately 50,000,000 of these bags.

Open-mesh bags for visibility

Another type of textile bag that should be mentioned is the open-mesh bag, made from strips of tough paper spun into yarn and woven into open-mesh cloth. These bags were used extensively for shipping fruits and vegetables and their use has increased greatly due to the shortage of boxes and crates. They are made in various colors to contrast or harmonize with the contents. They are available in both bulk and consumer sizes. Their appeal is the visibility given to the product and the color they add to displays in stores.

Because of their low cost, their space and weight saving, their ease in filling and closing, textile bags will continue to gain in application both now and after the war. The new developments including such features as stronger bags made in combination with plastic materials, wet-strength papers, waterproof tapes and other advancements, will produce bags which will be preferred on a large number of counts, particularly in the heavy-duty field for chemicals, agricultural and building materials.

5. Standard, semi-automatic machine closes textile bags.

5



Heavy-duty multiwall bags

Adelmer M. Bates was not in the bag business. Back in the Gay Nineties he was a salt salesman. He could sell more salt than his firm could pack, a situation that has made him the father of the multiwall bag.

In 1942, about 1,000,000,000 of these containers were shipped to American industries for the packaging of approximately 300 different commodities. Many times they can double for steel and fabric. They are surviving the hazards of wartime transportation. They can even be loaded with molten compounds at 450 deg. F.

Bates' inventions, patented in 1898, were the now familiar valve bag and the machinery designed to fill it. Soon his company was filling salt bags so fast, the commercial world began to take notice and more and more packers cast their eyes enviously at paper bags as a solution for mass production in their various industries.

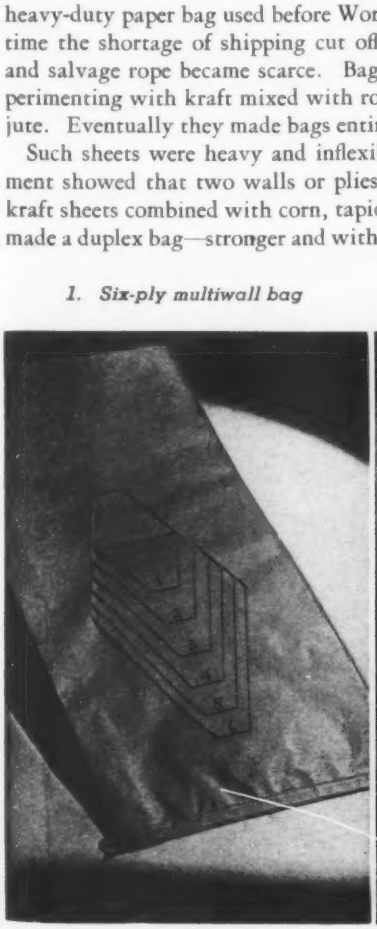
But these early bags were not multiwall bags. They were single wall, made of salvaged rope stock from ships and docks and construction jobs. They were used widely for flour, cement, plaster, lime and other building materials. Such containers were about the only kind of heavy-duty paper bag used before World War I. At that time the shortage of shipping cut off supplies of hemp and salvage rope became scarce. Bag makers began experimenting with kraft mixed with rope fibres, sisal and jute. Eventually they made bags entirely of No. 1 kraft.

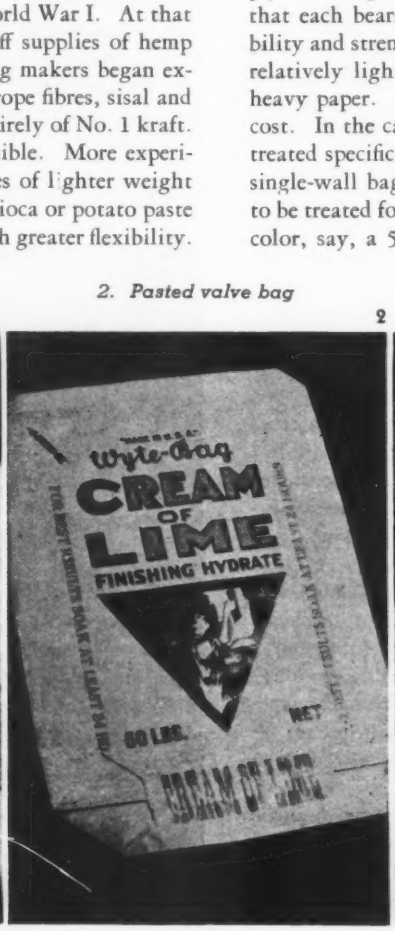
Such sheets were heavy and inflexible. More experiment showed that two walls or plies of lighter weight kraft sheets combined with corn, tapioca or potato paste made a duplex bag—stronger and with greater flexibility. Soon the advantages of more plies were apparent, but not until further development of machinery for making bags of more than two plies did the development get into its present stride. This happened about 1925. Until that time all of these bags were pasted satchel bottom type. Then a method of sewing the ends was discovered which made it possible to combine a number of sheets.

This was the real beginning of the multiwall paper bag as it is known today with the many combinations of sheets to meet each specific requirement of the more than 300 products packaged. Since 1935, the numbers of these bags used has tripled and the list of products includes chemicals, building materials, foods, animal feeds, clothing, drugs, fertilizers, seeds, fuel, explosives, cleaning compounds and many others.

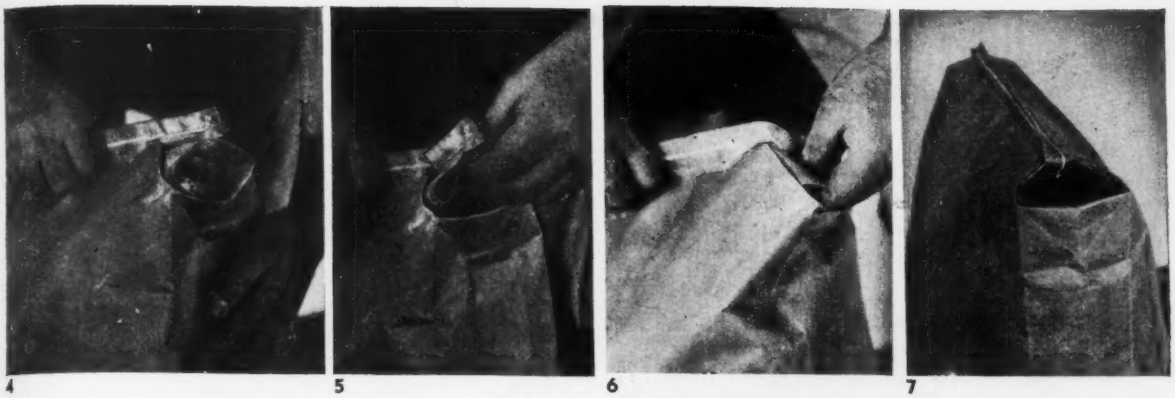
The modern multiwall bag is usually made with from three to six walls of kraft paper, depending upon the weight, density and physical characteristics of the product they are intended to carry. There is a possibility they may be made up to eight plies in the future. Each ply is arranged in tube form, one within the other, so that each bears its share of the burden. Greater flexibility and strength are obtained by using several walls in relatively light basis weights rather than one wall of heavy paper. A further advantage to the user is lower cost. In the case of the multiwall bag, each ply can be treated specifically to meet its requirement, whereas if a single-wall bag were used, the entire sheet would have to be treated for each requirement. It is less expensive to color, say, a 50-lb. outer sheet, moistureproof a 40-lb.

1. Six-ply multiwall bag *2. Pasted valve bag* *3. Sewn valve bag*









4 5 6 7

4. Sewn valve bag showing inner sleeve. 5 and 6. Pressure of contents automatically flattens and closes valve. Demonstration shows opening and folding of sleeve. 7. Multiwall bag with valve and sleeve closed. Photos St. Regis Paper Co.

inner ply, treat another 40-lb. ply for wet strength than to process a 130-lb. basis weight single-wall sheet to meet all three requirements. Adding color to the heavy sheet, alone, would cost nearly four times as much as it does to color a 50-lb. sheet.

The average heavy-duty multiwall bag is constructed usually of several sheets ranging in basis weight from 40 to 70 lbs. each (reckoned by weight of 500 sheets 24 in. by 36 in.). The most frequently used paper sheets are in the 40- to 50-lb. basis weights.

The multiwall bag is custom made. Size and construction cannot be made up in stock items because each product packaged has different requirements. Size depends upon the weight per cubic foot of the product to be packaged. A 100 lbs. of cement, for example, is not comparable with a 100 lbs. of feathers. The latter are so light that a bag large enough to carry a 100 lbs. would be impractical. Construction depends upon the physical and chemical characteristics of the product and on the circumstances of shipment and use. Some products must be protected from loss of moisture in the product; others must be provided with barriers to keep moisture from being transmitted into the bag. Some products must be packed in a bag that can withstand high temperatures. Others must be provided with walls that will not crack at low temperatures. Sometimes all of these requirements and more must be incorporated in the construction of a bag for just one product.

Before suppliers of multiwall bags recommend a bag suitable for a particular product, it is helpful for them to have such data as the following:

1. Name of the product.
2. Characteristics of the product to be packed.
   a) Fineness.
   b) Flowing qualities.
   c) Weight per cubic foot—(1) loose, (2) settled.
   d) Temperature when packed (if hot liquid, the cold flow properties of solid).
   e) Percentage of moisture.
   f) Required protection against moisture loss such as is likely to occur in normal atmospheric conditions.
   g) Hygroscopic or deliquescent properties.
   h) Chemical action on paper.
   i) Poisonous or dangerous qualities.
3. Present package used—(a) type, (b) cost, (c) weight per unit, (d) protective liners, coatings, etc.
4. Present filling, weighing and closing method.
5. Seasonal or year-round production.
6. Type of shipments in general use: carload, LCL, truck, barge, export, air, any other.
7. Conditions of handling.
8. Value per unit of product (lbs. or tons).
9. End use of product.
10. Special storage conditions.

Such data help to furnish a background to the technical department of a multiwall bag manufacturing concern for its work on the development of a satisfactory bag and packaging equipment. Usually, technicians and engineers work right in the plant of a prospective user to get a complete picture of a particular problem and to make tests of bags under actual conditions of use. Only after that, are they ready to suggest size, construction, closing, sealing and filling methods. From such study, they may determine which of the dozens of different sheets used for the plies will give the best performance. They can recommend what special treatments, finishes, coatings and impregnations are required for these plies in order to provide:

1. Waterproofness.
2. Moistureproofness.
3. Vaporproofness.
4. Greaseproofness.
5. Resistance to chemical action.
6. Resistance to temperatures.
7. Resistance to gases and smoke.
8. Resistance to adhesion.
9. Resistance to infestation.
10. Resistance to sifting.
11. Protection against mildew and bacteria.
12. Easy emptying.
13. Resistance to scuffing.



8. Multiwall bags are delivered in flat bundles, handling and storage are made easy. Photos St. Regis Paper Co.

One or two examples will show how paper bags have been successfully developed to solve the most difficult packaging problems.

Several years ago, a multiwall bag supplier was asked to design an economical, one-trip container for calcium chloride to replace steel drums because the latter were expensive, bulky to store and required extra bookkeeping.

Calcium chloride must be delivered dry and free flowing. It must be packaged at 205 deg. F. It is so hygroscopic that moderate moisture cakes it; so deliquescent that excessive moisture sends it into solution. To meet these requirements, a five-ply bag was developed which does the job so successfully it is used more or less as a yardstick for comparing packaging problems with similar characteristics in greater or lesser degree. Three of the plies are kraft and the two inner ones are a special asphalt laminated sheet highly resistant to air-borne moisture and to capillary action.

The usual package for asphalt had been clay-coated steel drums. These take a great deal of metal and cannot be reused because they have to be destroyed to remove the solidified asphalt. Packaged at temperatures up to 450 deg. F., molten asphalt calls for a container that will resist this heat and, at the same time, have the necessary strength to cope with its cold flow characteristics.

Molten asphalt is now being successfully packaged in a multiwall paper bag. A liner of natural kraft paper coated with a special clay and casein formula is performing this service. This coating will stand temperatures of more than 450 deg. F. and prevents the penetration of molten asphalt into the paper. The liner prevents the asphalt from sticking to the paper after it has cooled.

A brief description of specially treated sheets in general use for the plies of multiwall bags will give some idea of the types of materials that impart protective and tensile properties to finished multiwall bags.

Types of plies

Clay-and-casein coated sheets to withstand high temperatures have been described above.

Two lightweight kraft papers laminated with a continuous film of asphalt have exceptionally high water and moisture resistance qualities and are the best all-round moisture-resistant paper at relatively low cost. The melting point is approximately 170 deg. F. Asphalt can be obtained in higher melting points where absolutely necessary. However, such sheets are inclined to become brittle, particularly when they are exposed to cold temperatures.

High-sized and moderately high-finished papers are available as outside walls, particularly on fertilizer bags. They stand rain well. Other high finishes make the paper slightly slippery so that dust will not adhere to the surface. Tub-sized sheets are made for outside walls for application where scuffing is apt to cause heavy breakage. Wet-strength sheets are specially treated to provide higher scuff and abrasion resistance, and are used as inner plies in bags for products packed wet to prevent the disintegration of paper. A good example of this use is the multiwall bag for potatoes.

Crepe kraft is used in the tape of sewn-end bags and for tuck-in sleeve valves. In some instances, it also has an advantage as one or more plies in the body of the bag.

Wax papers, treated with both paraffin and microcrystalline waxes, are used to give moisture resistance. These sheets have a wide range of temperature resistance, but should be used only within limits recommended as the result of careful testing.

Kraft paper, treated by immersion into an asphalt-wax combination is not as moisture resistant as the asphalt laminated paper and transmits more moisture, but it also transmits less than regular untreated papers. Such a paper may also be treated to resist the penetration of grease.

Glassine is used as an inner liner to resist penetration of oils or greases that might ordinarily be absorbed from the bag contents by natural kraft and similar papers. Sometimes two glassine sheets are laminated together with a wax base adhesive for this purpose. Such a sheet is used as a liner in bags for such products as sweeping compounds. It also has high moistureproof qualities, but very hygroscopic materials such as calcium chloride will dehydrate the glassine and cause it to shrink and become very brittle.

Cellophane, pliofilm, metal foil and parchments are also used for special protective purposes and in the construction of multiwall bags are usually laminated to one of the plies, depending upon the requirements.

Arrangement of plies from inside to outside is usually determined by the requirements of the product and combinations may be in any order which will do the job best.

Generally speaking, heavy-duty multiwall bags are made in sizes to contain 25 to 100 lbs. The latter figure is about the largest quantity that can be carried. Linear measurements usually start at about 10 by 25 in. and increase to 20 by 50 in. with $^1/_2$-in. variations in length or width. Often density of product necessitates such variation. For example, lime bags of the same weight capacity may be 17 or 29 in. or 20 by 40 in. depending upon

the density of the product, because some lime compounds are more dense than others.

Adhesives used between the plies are mostly of vegetable origin, although animal glues are occasionally used. Latex, before the war, was one of the best waterproof adhesives for this purpose. Reclaimed rubber glue has proved a satisfactory replacement for latex.

General types of multiwall bags

The valve bag is factory closed—that is, the top and bottom are closed either by sewing or by pasting and one small opening is left in one corner. This valve serves to admit the material into the bag. The valve closes automatically and instantly because of the internal pressure of the contents of the bag as soon as it is filled and dumped on the floor, slide or conveyor belt. To insure against moisture penetration and sifting, and to give added protection against penetration of micro-organisms, the valve of the multiwall paper bag may be equipped with a "tuck-in" sleeve which is tucked into the valve as soon as the filling is terminated. Today, ends are often dipped for further protection.

Open-mouth bags are factory closed only at one end; the other end is left open. This type of bag is usually filled from a hopper. The bag is held in position manually or by a bag-holding clamp.

Open-corner bags are sewed bottom bags. The open mouth is partly closed by sewing, an intermediate variety between open-mouth and valve-type bag. Open-corner bags are often used for packaging commodities which are liquid when poured hot into the bag, but which harden as the product cools. This type of bag is closed by stapling the open corner while the product in the package is still in a hot and liquid state.

Packing and closing

Multiwall valve paper bag packing machines are of four basic types: screw, belt, impeller and gravity—so called because these are the methods by which the materials are propelled through the filling tube and into the bags. Adjustments and variations of these four types have been developed for more than 100 products. Number and size of filling tubes vary with required production. Machines are adjustable for various bag sizes. Products may be pre-weighed or filled and weighed simultaneously.

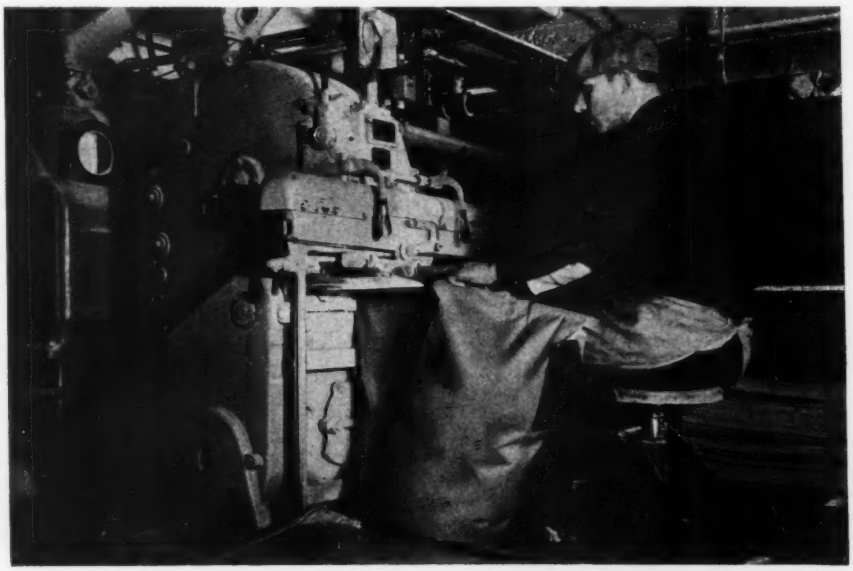
Open-mouth bags are closed by sewing, wire tie, staple or gummed tape. The sewn type closure can be accomplished automatically with sewing equipment which applies a bound-over tape and filter cord and penetrates all plies of the bag. The wire tie is efficient for applications where the number of units packed does not warrant installation of automatic equipment. A hand-twisting tool constitutes the entire equipment for effecting a securely tied closure around the neck of the bag. Stapling can be done by hand or with automatic equipment. This type of closure is used for bags containing such products as potatoes, coal and asphalt. Gummed-tape closure is accomplished by folding the plies of the bag and sealing the final fold with gummed tape. Most common use for this is in smaller sizes.

Due to the shortage of fabrics and metal, many packers have turned to the multiwall bag to supply their needs for containers. Companies who have used fabric bags previously, can adapt existing bag-closing equipment to handle paper bags with very slight changes in most cases and with a minimum of critical material. Bag packers, sewing machines and wire ties required for the conversion from critical containers to less critical containers are available.

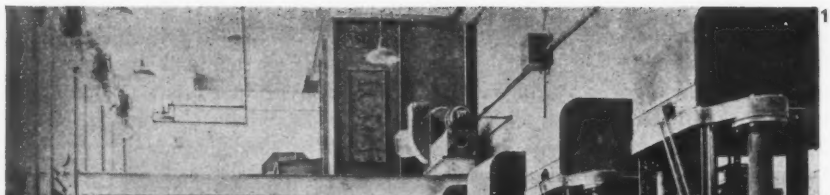
QMC overslip multiwall bag

Interesting tests on the performance of multiwall bags were those made by the Technical Committees of the Paper Shipping Sack Manufacturers' Assn. and the Textile Bag Manufacturers Assn. Tests were made with cloth bags in combination with an overslip multiwall

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9. Filling multiwall bags in a sugar refinery. The operation is semi-automatic, the bags being held in place while the operator uses the two-tube filling machine of the belt type. Photo St. Regis Paper Co.



10

10. In testing, multiwall bags are subjected to treatment which is more severe than that which they will receive in actual use. Illustration shows devices in the testing laboratory for every kind of drop and handling test. Bags for the Office of the Quartermaster General were given such tests. Photo St. Regis Paper Co.

bag for the Army, Navy and Department of Agriculture. The tests were based on procedure approved by Containers Branch of WPB for the overseas method of shipment in accordance with OQMG 103 Specifications. This specification was written to give added strength and moisture protection to fabric bags by placing them inside a 5-ply multiwall bag. The tests, however, were made to show relative performance of such combinations as well as multiwall bags within multiwall bags, and multiwall bags without inner bag. The test products were flour, beans and salt. Methods included: (A) A cycle of free drops ranging from 5 to 10 ft., planned in such a way that no one single part of the sack construction could escape trial and that both machine and cross directions of the paper were subjected to rough treatment. (B) Repetition of the cycle after the various bag combinations had been weighed and sprayed for 12 hours. (C) Repetition of the cycle a third time after the bags had been subjected to submersion for 24 hours. All tests were conducted at temperatures not less than 50 deg. F. and 60 per cent relative humidity.

Conclusions reported were as follows:

1. For conditions requiring maximum resistance to water penetration these tests and general experience indicate that multiwall within multiwall is superior.
2. The substitution of five plies of all wet-strength kraft overslips in the present OQMG 103 Specifications (fabric bag within paper multiwall) provided a superior overseas package to the one which is now giving satisfactory service.
3. In the "A" tests (dry) the current OQMG 103 combination will withstand greater punishment than a single 6-ply multiwall paper shipping sack.
4. In "B" tests (24 hours spraying) the 6-ply multiwall sack made from all wet-strength paper gives a better performance when wet than the current OQMC 103 combination.
5. In the "C" tests (24 hours submersion) the 6-ply multiwall sack made from all wet-strength paper gives a better performance when wet than the current OQMG 103 combination.

Future of multiwall bags

Multiwall bag manufacturers say few industries that have ever used multiwall bags go back to other containers. The efficiency, easy handling, small-space storage requirements of these bags give them distinct advantages. However, in the postwar era, competition will be keen among all package suppliers to retain gains made during the period 1935 to 1941. But multiwall bag manufacturers do not consider their gains entirely a wartime condition. During the past three years, production has been increased some, but the trend has been toward a level of about 1,000,000,000 multiwall bags a year. This leveling off is attributed to a falling off of civilian construction and building activity, which in normal times requires many products packaged in bags. Bag production is now being used for military purposes and for replacements of containers not now available. Although the number of bags produced in 1941 was substantially the same as in 1942, about 50 per cent of the 300 products now in multiwall bags are new uses. If these new users continue to buy bags after the war and if more bags are required for materials supplied to the building trades, then bag production is bound to continue at a high level—even when military uses are curtailed. Newcomers are also entering this field of packaging. For example, blocks of synthetic rubber are being placed in multiwall bags. And this is only one of the new products that will find an important place in the packaging picture now and after the war.

Bag sealing & closing

by E. G. Kuhn

Like a bottle, a bag has only one opening. If its walls are sufficiently strong for the intended purpose and its seams are sufficiently tight, it will afford adequate protection to the product, subject only to one consideration—namely, the effectiveness of its seal. If the seal is weak, it will not matter whether or not the bag was strong. If the seal is difficult to open, the consumer will find little satisfaction in the other good points of the bag. If the seal is difficult to re-close and the product is one which is not consumed in a single serving, consumer dissatisfaction can well be anticipated.

Because the bag closure is so vital to the proper functioning of the bag as a container, bag manufacturers, machinery manufacturers and packagers have worked hand in hand to develop closures which would solve the difficult problems confronting various packagers. Ingenious structures are today available providing closures fully adequate to meet virtually every problem. High-speed machinery is available to form and apply them.

Bag construction, materials and equipment will vary in almost every separate case which might be considered. It is therefore the purpose in the paragraphs which follow to present only a brief outline of some of the more widely used seals or closures employed on the modern retail or consumer sizes of bags.

It can be assumed in reference to each type of seal that maximum packaging economy, as well as standardized effect, is possible only through the use of the equipment which in almost every case has been developed concurrently with the introduction of the seal, or later as a means of adapting it to modern production requirements.

The Allison closure—Seals contents with a triple fold which is further reinforced by a strip of gummed tape. Folds are pressed firmly against contents while tape is rolled down bag sides. Offers good protection for product and easy stacking.

The Betner seal—Employs a tin tie strip which is attached in an exposed position to the bag top by a machine which completes the regular over-and-over fold operation and then folds in a metal tie. This type offers re-sealing advantages.

The Delta seal—Folds bag top to produce oblique overimposed folds and in manner which when cut according to instruction produces a pouring spout for contents. The top of the bag when sealed presents a flat surface well adapted for stacking.

The Sealtite closure—A simple and extremely practical over-and-over fold which produces a compact, flat-topped package with excellent merchandising appeal. Adaptable for intuck or gusseted bags of either paper, cellophane or foil, a tight, sift-proof closure is claimed when this type is used.

The seal-tie closure—A modified use of the metal strip here preserves the re-sealing advantages, but confines the use of this feature to the secondary closing of the bag. The primary seal consists of an over-and-over fold securely pasted flat against top. A compact package with good display value.

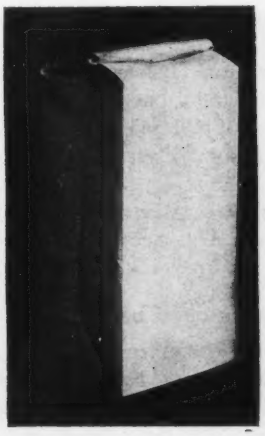
The square-top or flat closure—A method known as the Hesser, which has been popular in the past, uses a card which is placed inside the bag in most cases. The bag top is folded down and sealed by gluing with a top label (not gummed) glued on in addition. This type may be varied in at least two ways. For easy sifting products like sugar, the gluing is done in a different way and sometimes the top label is left off. Then the outer wrapper is die-cut, folded and glued top and bottom in a manner suggesting a band label which extends around the face of the bag.

The tin tie closure—Supplements standard bag construction with a paper-covered strip of metal, which patented feature is licensed to various bag manufacturers

Allison closure



Tin Tie closure



Delta seal closure



Sealtite closure





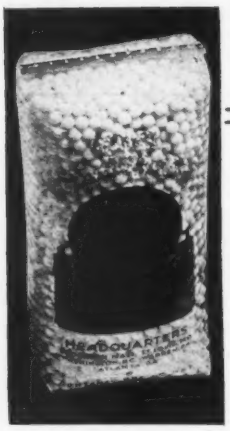
Hesser closure foil



Square-top or flat closure



Wire-staple closure



Metal-clip closure

on a royalty basis. Offers excellent re-sealing advantages at some sacrifice of absolute protection of contents. Wide variation of finished package effects obtainable. Automatic machinery has now been developed for applying this closure, though for many products, notably coffee, the hand-tying method is still extensively used.

The wire staple—An economical and, in certain instances, an entirely acceptable closure for both paper and cellophane bags. Classified as tamper-proof, although offering little resistance to moisture.

The Bagpak cushion-stitch closure—Used only on paper bags of the multiwall type. This requires a machine to apply and, in combination with a machine-sewed snake stitch, this closure is stronger than the walls of the bag. Kraft tape is applied over the stitching, thus sealing the needle holes, making a tight, sift-proof closure.

The Arenco closure—Adapted for coffee, sugar, salt, etc., this method applies by machine a paper tape all around the bag and effects a tight, sift-proof seal.

The Amsco double fold—A method of folding the tops of flat type bags in reverse directions, sealing by glue or heat, resulting in a sift-proof package which may be opened without tearing the bag.

Another method of mechanical fold, developed by the same company, folds the top of the bag twice in the same direction, applying the necessary adhesive before completing the second fold. Bag need not be torn when opening, and may be re-used.

Each type of seal illustrated and described has certain advantages which should be taken into careful consideration not so much on the basis of general merit, but rather from the standpoint of meeting the particular requirements presented by the product itself, the market it serves, competitive packaging and similar vital factors.

Alternate materials

Shortages of metal for ties and staples have brought about many ingenious developments of closures without metal. Several methods have been devised for using a heavy paper header which forms a closure the same as a metal one. This has been used successfully on coffee packages, as has another method of folding and crimping developed by A & P. There has also been progress in the development of weatherproof adhesives for seals and adhesives compounded from non-critical materials.

Heat-sealing processes

The use of bags formed of transparent cellulose or acetate sheeting, rubber hydrochloride sheeting and similar heat-sealing films has brought about a rapid development of heat-sealing closures and methods of applying the same. The simplest of the heat-sealed bags is the pillow type formed from a tube of transparent sheet and crimped at either end between hot plates to achieve a seam. Transparent bags are also made in the flat, square and satchel bottom shapes and all may be heat-sealed for closure. Two general types of heat-sealing equipment are available. One locks the bag ends between heated jaws. The second heat-sealing unit passes the bag through one or more pairs of heated rollers.

Heat-sealing may also be applied to waxed papers, waxed paper bags, waxed glassine bags or bags treated with some type of thermoplastic adhesive.

Machinery and equipment for heat sealing has kept pace with the development of bag closing methods. In at least one case the rotary principle is combined with pre-heater and conveyor to effect either a plain seal or to provide for one or two folds before sealing. Combination of glue and heat sealing is also possible.

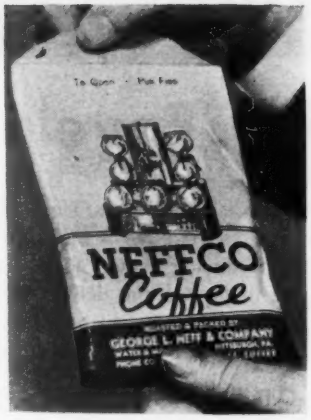
In some cases, excess air must be extracted before forming the seal. Machines are available to perform that operation, likewise to displace air with carbon dioxide. These refinements in bag closing have come in response to wartime packaging of metal parts and as space-savers.

Methods of bag closing

With the exception of the stapled bag—and this too may be closed by automatic instead of hand equipment—all of the closures shown require machine units for sealing. Such units for folding and sealing are usually in-



Arenco closure



Amsco double fold



Bagpak cushion-stitch closure

tegral with or included as a part of the weighing equipment customarily used.

In the closing of the larger size bags, there is a definite advantage, provided, of course, that production conditions are equal, in machine versus hand closing of bags. According to actual figures, obtained at one plant where both operations were used, the cost of machine sewing is approximately one-third that of hand sewing.

In general, the consideration of bag closures is of equal importance with that of the material from which the bags are made and their construction. It is essential, then, that manufacturers of bag closures and machines for forming them be freely consulted.

Comparative checking points

Bags sealed at the factory for today's export shipments must be judged by much more severe standards than would be applied to the ordinary bag used for domestic distribution or to the manufacturer-shipped bag carrying a single unit of merchandise. When powdered or granular material is bag packed or when essential weatherproof properties are required, the closure becomes the all-important point.

In considering closed bags of these types, the following may be taken as checking points: (1) Secure closure; (2) recloseability; (3) sift-proofness; (4) convenience in stacking; (5) convenience in packing; (6) cost and availability of necessary equipment.

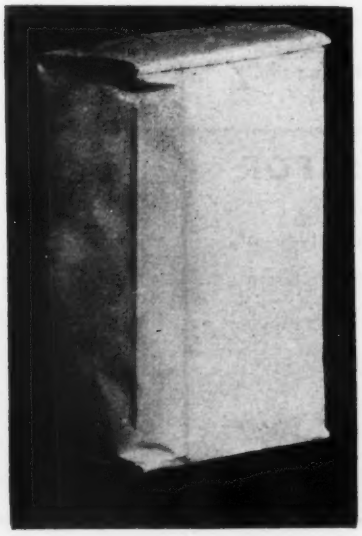
Checking against these points, one type of closure may be indicated in one instance and another logically chosen for a different product and different marketing or manufacturing conditions

See "Heat Sealing Principles," p. 431; "Heat Sealing Equipment," p. 521; "Bag Filling and Sealing," p. 530.

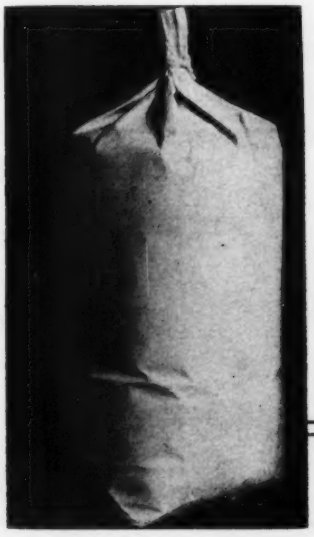
Double-fold closure



Pasted closure



Tied closure



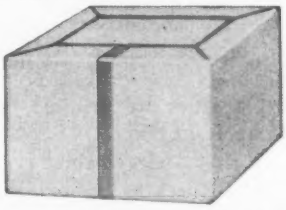
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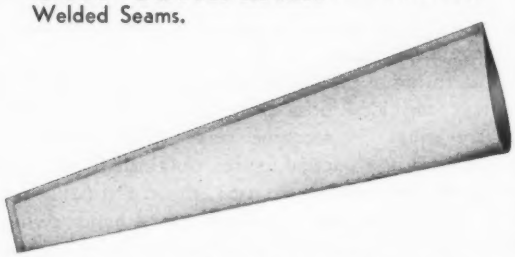
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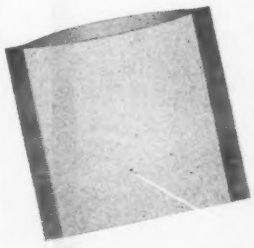
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Illustration Shows Heat-Welded Seams.

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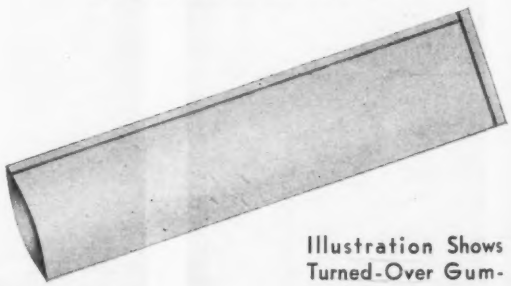
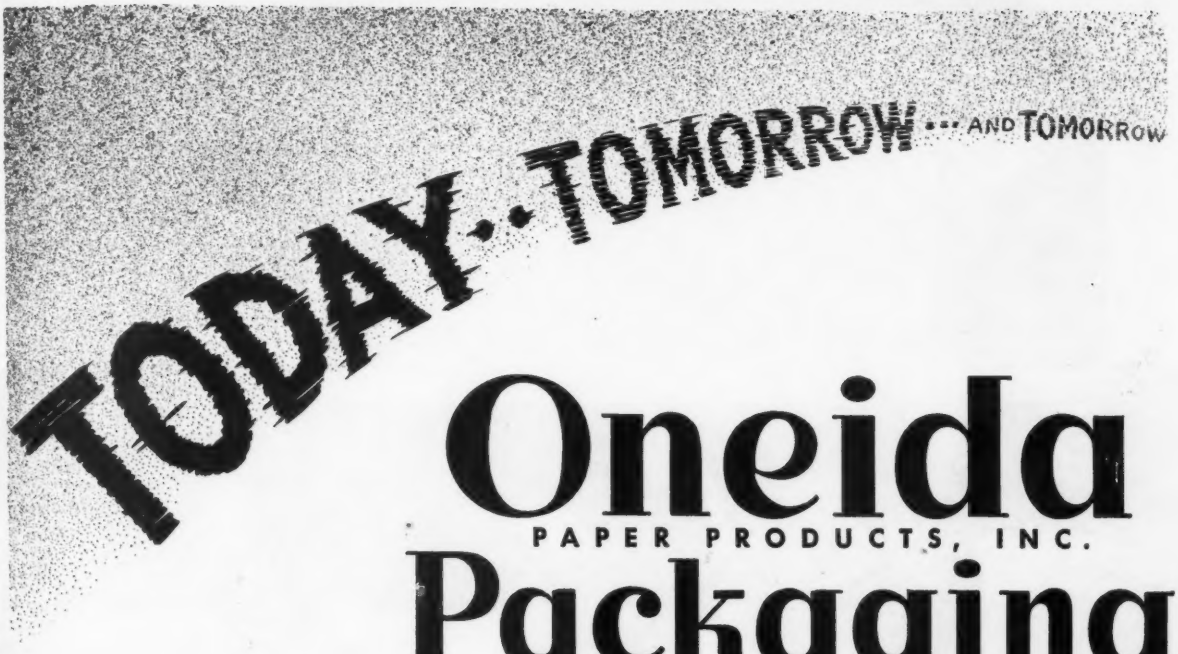


Illustration Shows Turned-Over Gummed Seams.

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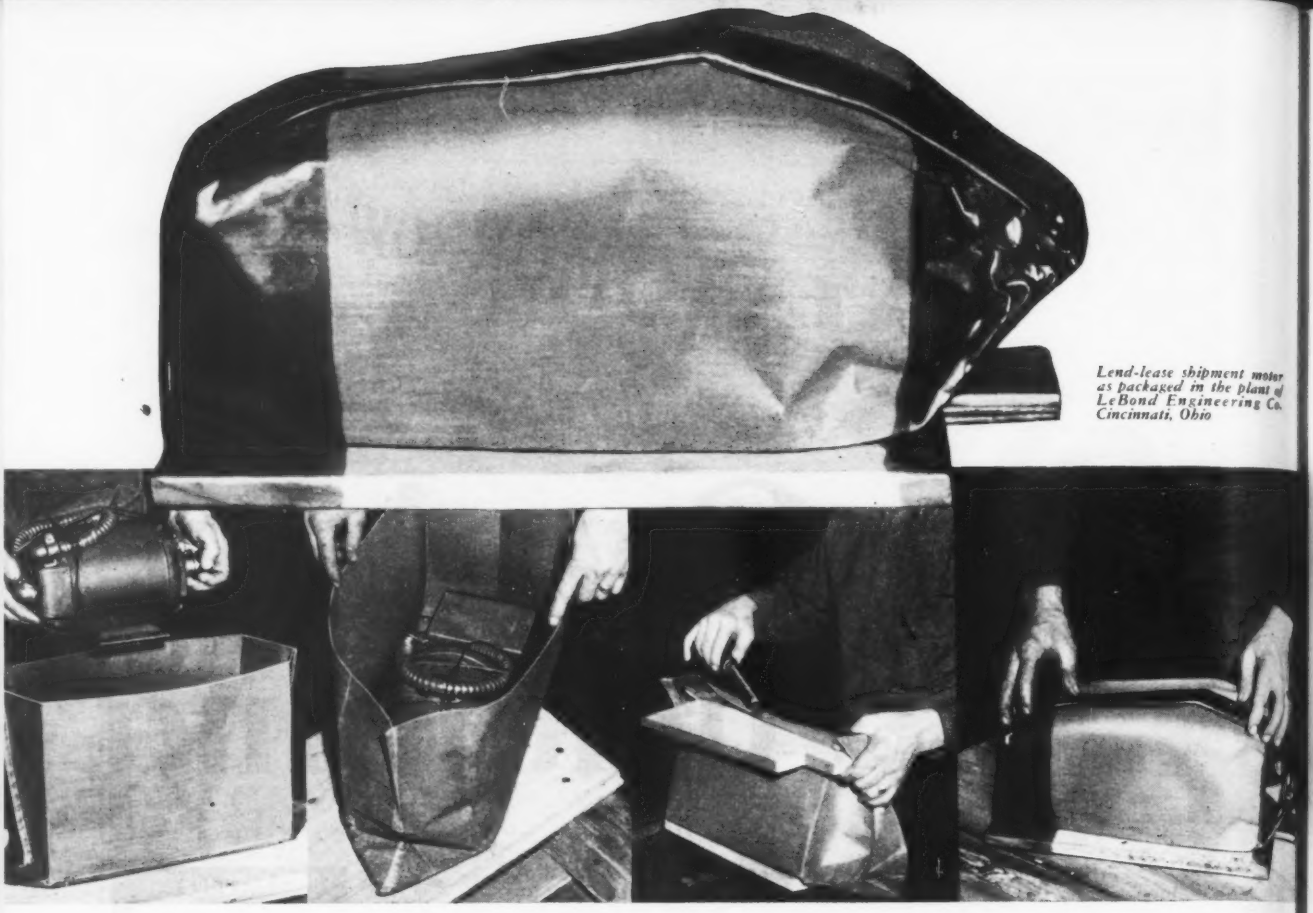
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Lend-lease shipment motor as packaged in the plant of LeBond Engineering Co. Cincinnati, Ohio

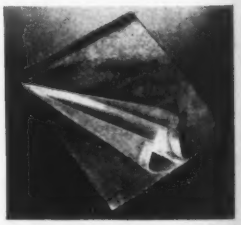
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PRINTED BAGS, ENVELOPES, WRAPS
SPECIAL ORDNANCE PACKAGING MATERIALS

Bags & Envelopes

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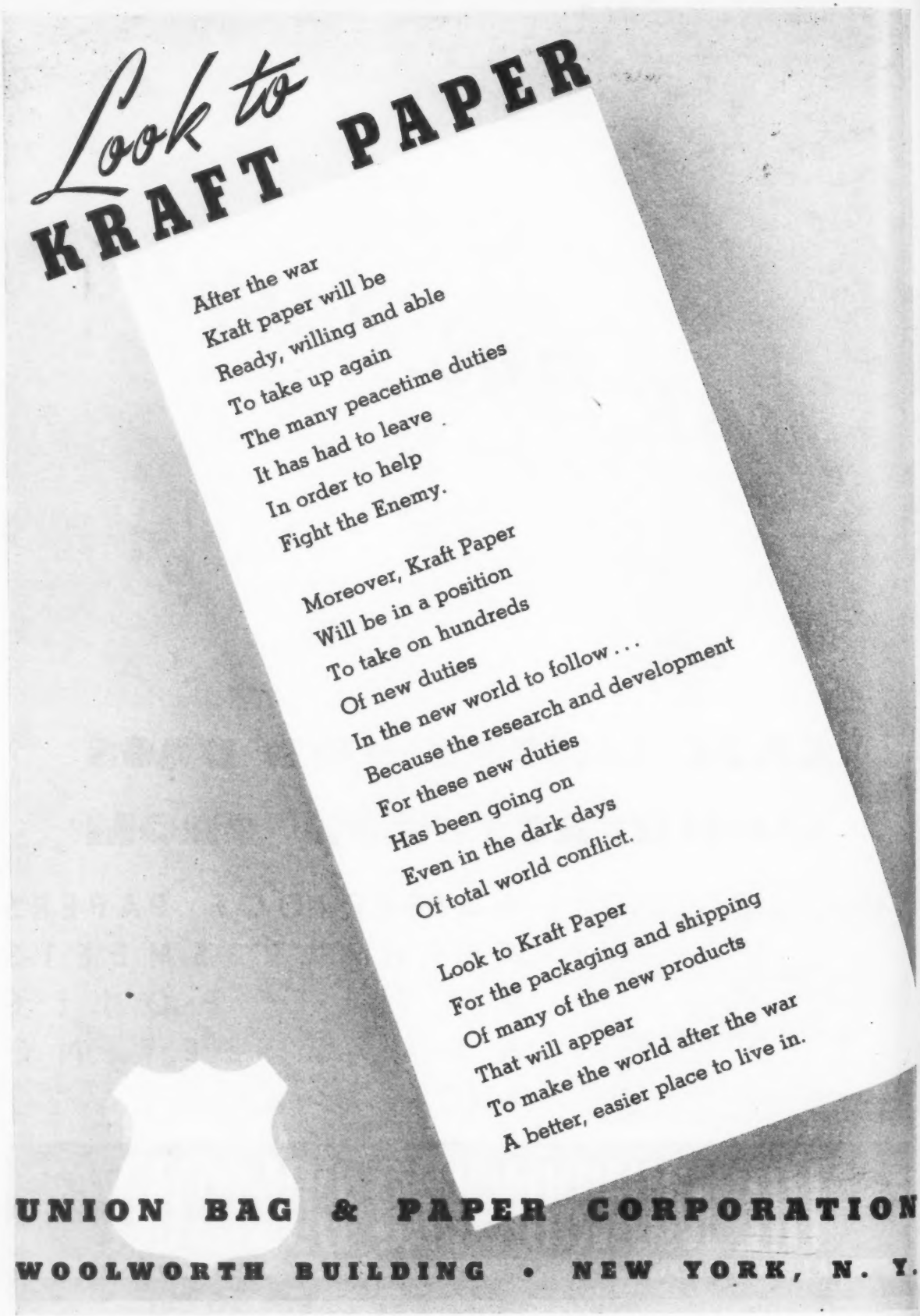
CASE LINERS AND BAGS MANUFACTURED FROM

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Kraft paper will be
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MANUFACTURERS OF PROTECTIVE PAPER BAGS

A handy index

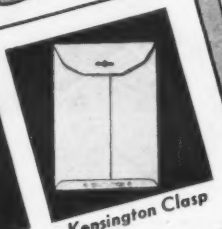
ENVELOPES



Open End Envelope



Coin Envelope



Kensington Clasp

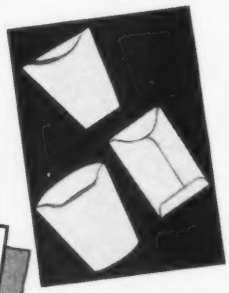
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PURITAN ROUND CUPS



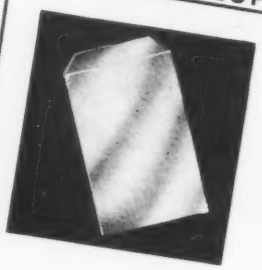
Puritan Round Cups are war-workers today. But when Victory comes, they will be back more plentiful and more attractive than ever before — in all styles — water, soda, take-out, food-pack, package and hot drink.

PURITAN FLAT CUPS



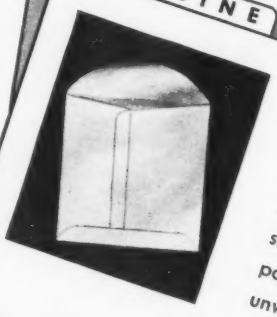
There are 3 styles — The Puritan, made of treated stock with a safety lip and tapered to fit the hand. The Old-style Puritan, slightly larger and also tapered. The Plymouth, smaller, with a safety lip, and made of untreated stock.

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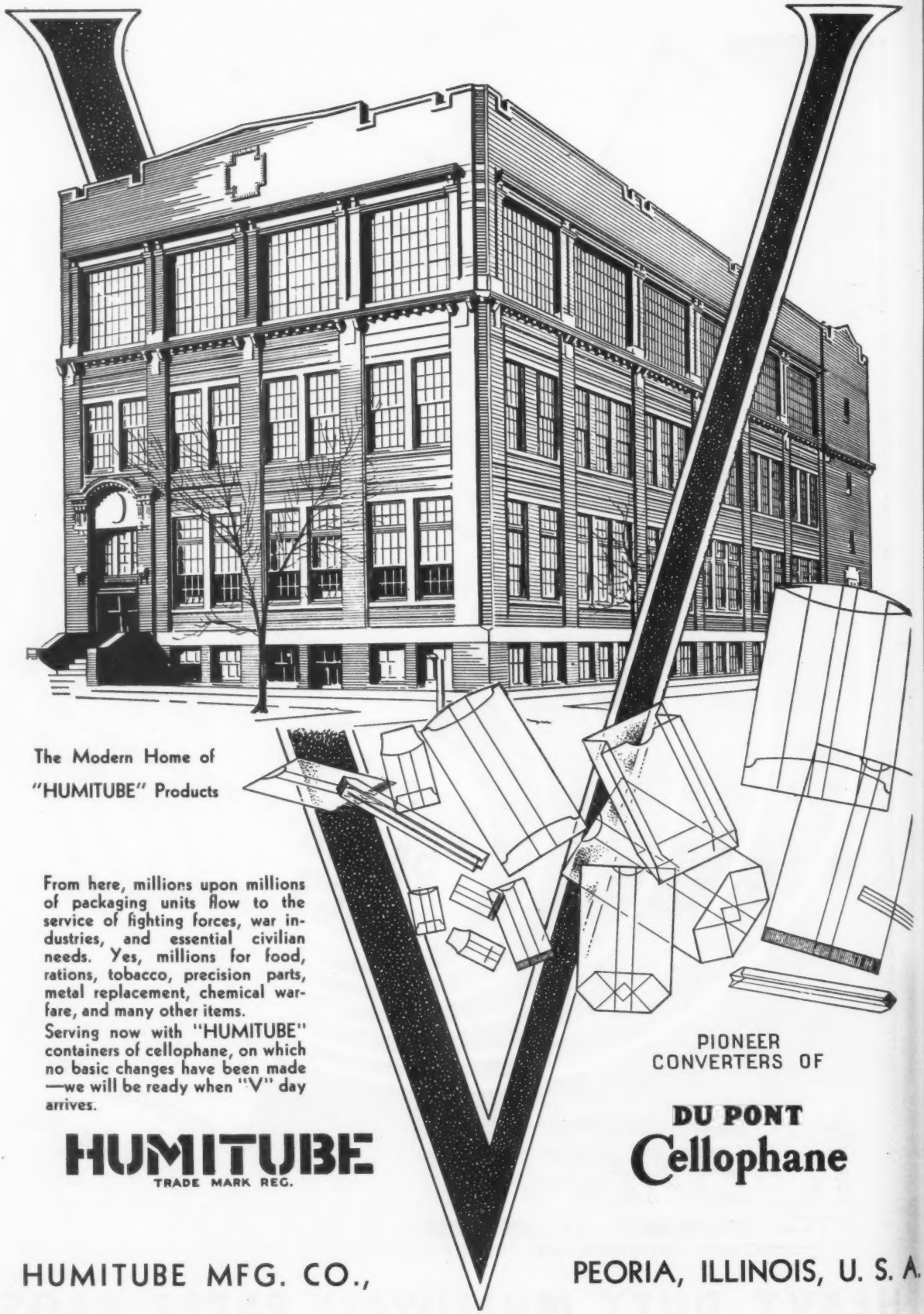
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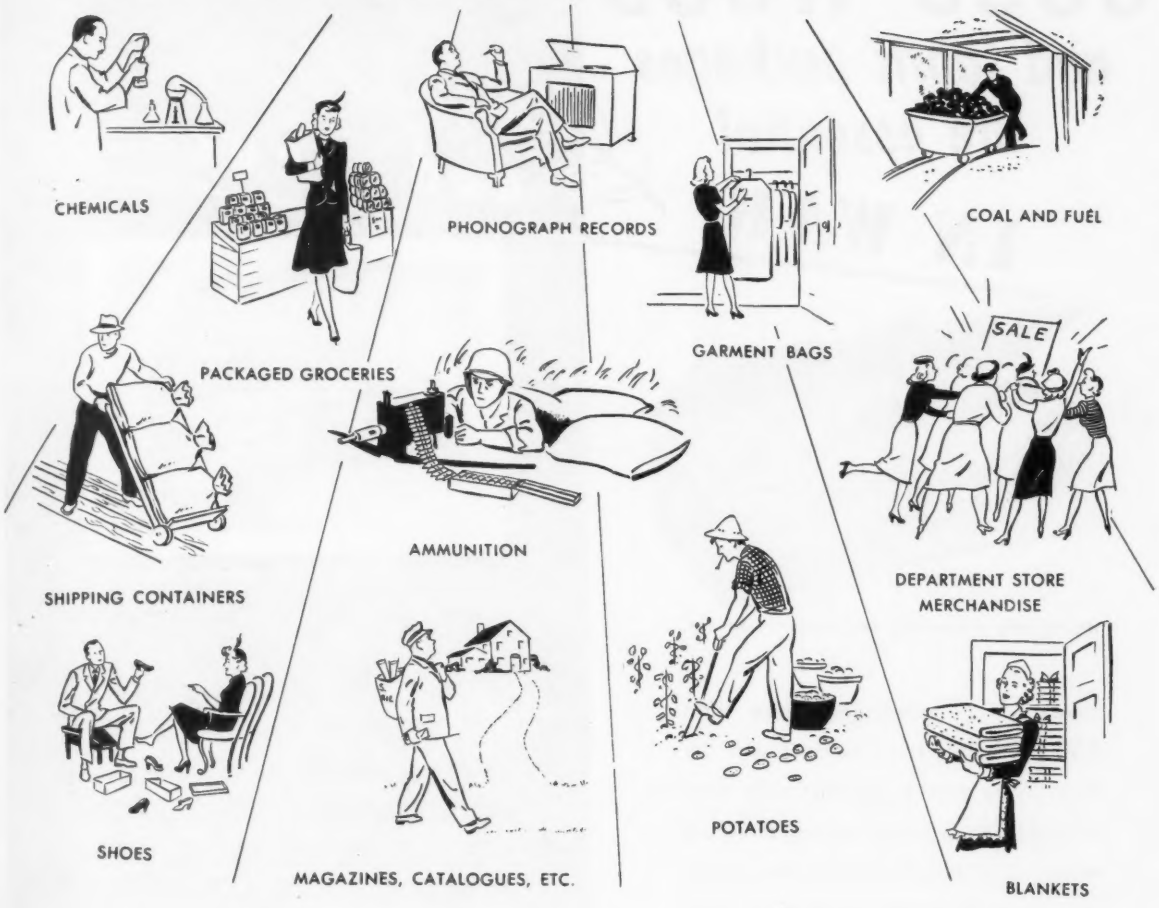
PIONEER
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HUMITUBE MFG. CO.,

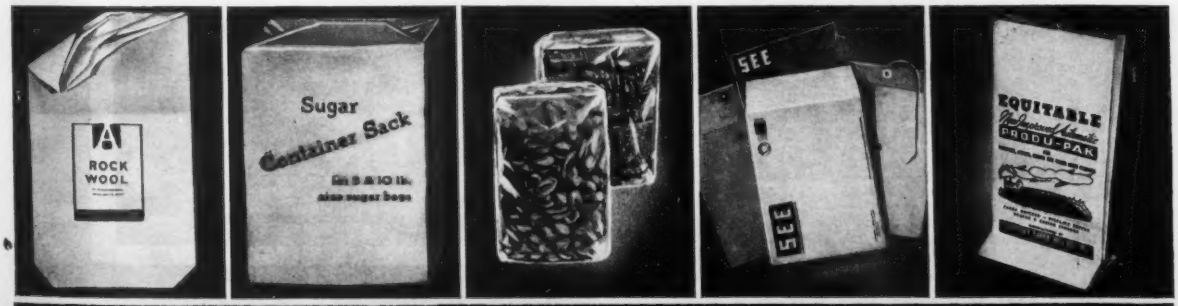
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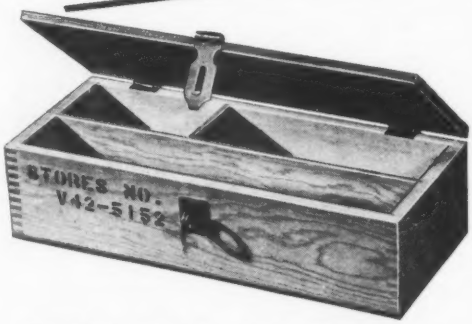


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Heavy-duty wood box for rugged war use.

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Fabric rolls and bags protect fine silverware.

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GLASS–POTTERY–CLOSURES

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The new importance of glass

by E. C. Emanuel

For 20 years or more, there has been a slow trend to a wider use of glass in packaging. When the present war began, this trend was sharply accentuated by the shortage of many packaging materials which resulted from the pressure of military needs. Products which for years had been packaged in other containers began to appear in glass, and the use of glass containers quickly rose to new high levels. This was to be expected, for although glass also is widely used in military channels, the raw materials for its manufacture are fairly abundant even in wartime, and glass lends itself well to efficient, large-scale production.

How much of this war-bestowed gain will glass hold after the war, when other materials are freely available again—and when the glass container must be sold purely on its merits instead of on the basis of merely being available? What technical improvements in the character of glass and glass containers, closures, liners, etc., have been made recently, and what possibilities of further improvements may be indicated in our current glass research?

For the present, problems of production seem to have taken precedence over problems of merchandising. Many manufacturers are finding that they can sell just about all they can produce without much regard for how their product is packaged. But after the war it is safe to assume that this picture will be changed completely, and in the postwar battle for markets we can expect to see sales managers striving, perhaps as never before, to put sales appeal into their packages.

1. Glass packages have for many years been the standard for a variety of foods. Photo Owens-Illinois Glass Co.



1

Glass has long been standard for many products

Glass has for many years been the standard container for beverages of all kinds, both still and carbonated, for pharmaceutical products and druggists' sundries, for some household products, and for a variety of staple food products such as milk and cheese and cheese spreads, edible oils and nut butters, salad dressings, olives and pickles, catsup and chili sauces, jams, jellies and preserves, and some fruit juices.

The extension of the use of glass because of the war has been most marked in two main fields—food products and industrial products.

It is altogether likely that most industrial products which now are packaged in glass as an alternative material will return to the containers in which they were packaged before the war.

In the food field, however—particularly for fruits, vegetables and vegetable products—glass can be expected not only to hold its gains, but to extend them, for many packers now are discovering for the first time that glass is the best container for such products.

Demand for distinctive package favors glass

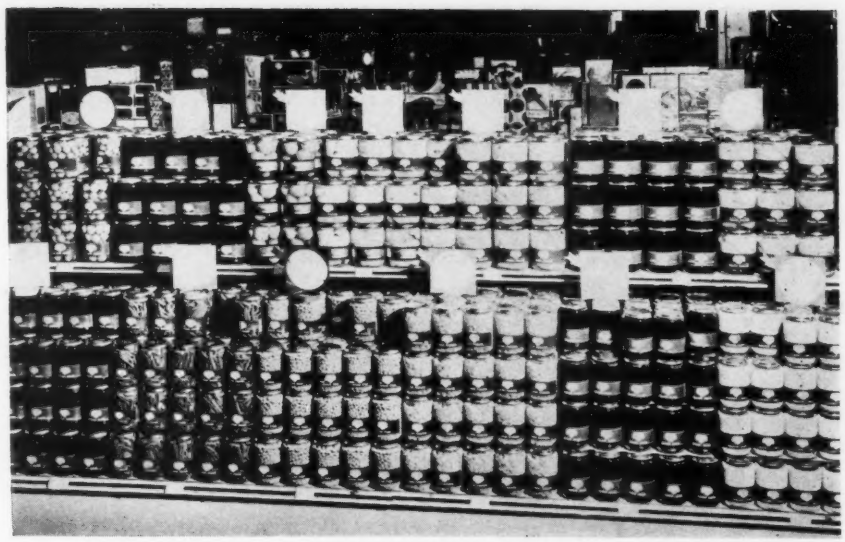
But we can expect an increased use of glass in the postwar period throughout the packaging field. Competent observers believe that the end of the war will launch a new era of merchandising. The nation's production facilities have been expanded tremendously by the demands of war, and when peace returns the necessity of utilizing this expanded plant production may well result in a period of competitive merchandising stiffer than we have ever seen before.

A flood of new brands and products may be coming. Many new companies may appear. Most firms, we know, are doing extensive postwar planning. All this will tend to increase the competitive pressure which doubtless will send many manufacturers searching for a new distinction in their packages. Some probably will redesign their packages, using a standard glass container as a base. Others may decide on an entirely new package, starting from scratch. We may expect to see an entirely fresh approach to the whole subject of packaging.

This would present a golden opportunity for glass. The use of glass as an alternative and as a temporary expedient during this war period has broken down a great many prejudices against it, and the postwar era should see glass taking a much more prominent place in the packaging picture than ever before.

The demand for a distinctive package should benefit glass for a wide variety of reasons. There is no perfect package—no container is suitable for all purposes—but glass offers many advantages which are not found in other packaging materials.

Glass is inert to most products and therefore does not



2. The fact that the consumer can see what she is buying is one of the great advantages of the glass container. Here a mass display is arranged in tiers with an eye to the color effect. Photo Owens-Illinois Glass Co.

transfer taste, odor, dissolved substances or the products of corrosion into the commodity. Most other containers are limited as to shape, but glass allows great variety in shape and design, subject only to a few basic geometrical and manufacturing limitations.

Glass is inherently attractive, and the container may be enhanced infinitely by numerous devices. Trademarks or other distinctive designs may be molded into the glass container, which may be of the common transparent "flint" type or may be one of many shades of amber, green or blue. Amber glass protects products, such as pharmaceuticals, which are subject to the action of ultraviolet light. It may be noted that the color of modern glass does not adversely affect the other physical properties or the chemical durability of glass, so an obvious possibility for the future is the development of greater color variety.

For the merchandiser in search of distinction in his package, interesting variations can be achieved in applied color on glass and decorative treatments involving the label or supplementary material such as raffia and foil. These decorative possibilities are subject only to the limitations of designer's ingenuity and the price which the merchandiser is willing to pay. It should be emphasized that the progress of the glass container depends to a considerable degree upon how the container is used to make the package, for the container itself is just one element in the package.

Transparency vital advantage in food field

The transparency of glass is of paramount importance in many fields of packaging, particularly foods. With other types of containers an all-covering label usually must be used. But a label, no matter how attractive, can scarcely compete with the sight of the actual product. The glass container is its own window display for the cherries, peaches, plums, beets, peas, corn, or other fruits or vegetables which it contains.

This extra sales appeal of glass becomes particularly important when considered against the background of the modern trend in food marketing methods which sends the customer herself among the shelves to select, without help or advice from a sales clerk, her own products and brands.

The transparency of glass also offers a specific advantage to the manufacturer or packer because it allows the product to be inspected visually at any point during processing, storage and distribution.

Glass food containers can be made attractive enough so that they will be taken directly to the table for serving and, when the contents are entirely consumed, the containers may be re-used—a point which has been found to have great appeal for many housewives.

The advantages of the glass container are such that many manufacturers, now using it for the first time, have decided that its merits more than balance the additional cost of glass. After the war this cost differential—which now is not great as it once was—may well be reduced further by the increased production of glass, by improvements in packaging lines and by other factors.

The standardization of glass containers, instituted by the WPB, is proving a benefit to all packers and glass manufacturers, especially in the fields of quantity packaging of staple products. Glass containers have been standardized as to shape (body design) as well as size, and these standard shapes are available with appropriate finishes such as side seal, CT (continuous thread) and other finishes which also have been standardized.

Fundamental advances made in glass industry

During the past several decades, and especially during the past several years, the American glass industry has made fundamental advances not only in the basic formulations, but also in the manufacture of glass containers. The next several years are almost certain to bring further improvements.

One of the important recent advances made by the industry has been in the direction of reducing weight and at the same time increasing the strength of the glass container. The rather thick walls of the containers common



3. Variety in shape, type and usage is available even with WPB standardized glass containers. This group for malt beverages includes: (1) 12-oz. Steinie beer bottle; (2) 12-oz. export beer bottle; (3) 12-oz. select shape beer bottle; (4) 12-oz. ale bottle; (5) 32-oz. ale bottle; (6) 64-oz. Steinie (unpasteurized); (7) 64-oz. select type for pasteurized beer; (8) 32-oz. export; (9) 32-oz. Steinie; (10) 32-oz. single-trip beer bottle; (11) 12-oz. single-trip beer bottle.

until several years ago were required to give the necessary strength to the containers of that time since they were manufactured with the existing glass-forming equipment. In the past few years, great strides have been made in better utilizing the glass throughout the walls of the container. Thus the production of standard shapes of less weight, but with better design and greater strength, than the older types was permitted. Still further developments along this line can be expected.

Closely allied with the factors of weight and strength is the element of breakage. But experience with this element, both in production and distribution, has been good. Many packers have for years been handling glass on cold-fill and hot-fill packaging lines without undue breakage. Many lines originally set up to handle other containers have been converted to glass, and are now handling the new container without excessive breakage.

True, a sharp or highly concentrated impact will cause breakage. But other containers under similar impact will become dented or distorted, and if the force is applied at a seam it may open a minute hole, causing loss of vacuum, with consequent spoilage later. It is apparent that proper handling, adapted to the particular type of container used, is necessary on any packaging line.

In distribution, the label "glass" on a carton traditionally tends to command extra respect from warehousing help, truckmen and store employees.

Improvements made in closures

Naturally, the future of the glass container, especially in the food field, is tied closely to the development of the closure. Up to this time, it was the closure that seemed to be retarding the progress of the glass container, and the most troublesome element in the closure has been the cap liner. But this liner has been steadily improved, and with the development of the new synthetic rubbers and other new materials, much further improvement is almost certain in the future. In the past, the necessity of using the different liners for different groups of products has worked against the extended use of the glass container, but it is not too soon to say that the universal liner is on the way.

While the standard side-seal closure and CT cap lined with rubber, synthetic rubber or flowed-in liners doubtless will continue to be used for closing glass, new types of closures also are in the offing. The standard closures in the past have been made of metal, protected on the inside with suitable lacquers and finishes, and lithographed on the outside with attractive designs or instructions for opening. With such closures a minimum of metal is used, and since this metal is not drastically worked in the formation of the closures, excessive distortion or deformation—which leads to corrosion—does not develop. Currently a glass closure with a rubber sealing gasket is being studied on a semi-commercial basis. This closure will permit the development of a food package consisting entirely of glass, except for the sealing gasket.

These improvements in closures, accomplished or on the way, of course apply particularly to the food field which may be expected to use a far larger amount of glass in the postwar period than before the war.

Because of the general improvements that have been made in glass containers and the possibility of further improvements, the breaking down of old prejudices against glass, the general sales appeal of glass, the variety of shapes and designs and colors in which glass is available, the versatility of glass in the creation of a distinctive package—because of these potent factors, we may expect to see a substantial increase in the use of glass in all branches of the packaging industry when peace comes.

Standardization of glass containers

by Dr. J. H. Toulouse

Standardization of glass containers has been made an important wartime measure through Limitation Order L-103 of the War Production Board. The realization that it was practically an all-domestic material—with only a slight demand for tin, steel and rubber for closures—first spotlighted glass as the probable substitute for other containers. However, it was necessary to find some means not only of facilitating its production, but of reducing the small amounts of critical materials used. Standardization was immediately seen as the answer to both of these needs.

Now that standardization has been an enforced reality for some months, it is time to take stock of it. It is time to see whether it has really accomplished what it set out to do, as well as to see if some of the worthwhile features should not be extended into the postwar.

Long before Pearl Harbor, standardization was being talked about. One Government agency, the Simplified Practice Division of the Bureau of Standards, under W. E. Braithwaite, had been talking standardization for years. Over three years ago, with the coöperation of the National Preservers Association, the National Pickle Packers Association, the National Peanut Butter Association and the Glass Container Association, a series of jars and bottles was developed by that division, and presented as suggested standards.

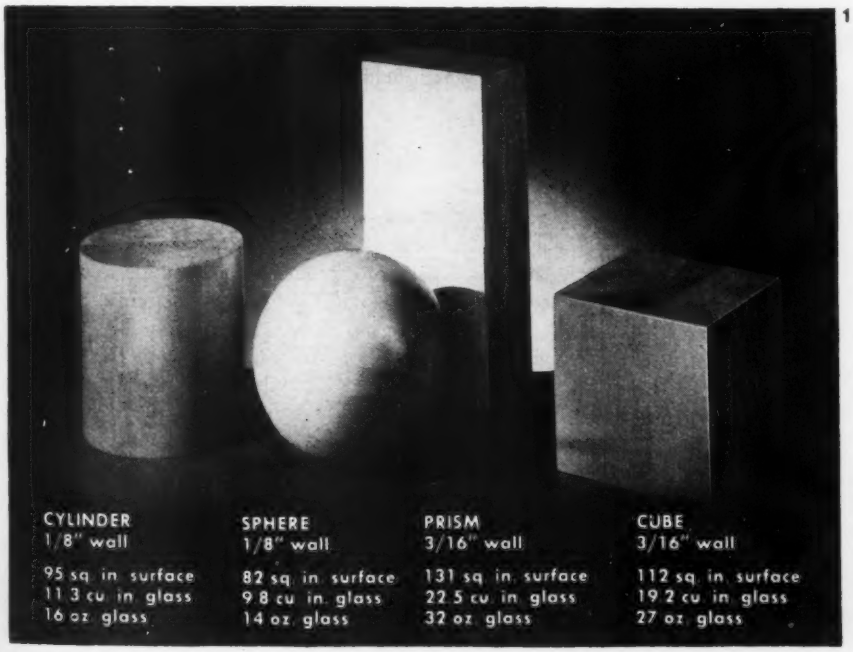
An entirely independent venture was that of the leading brewers' groups which had already suggested a reduction of bottle sizes and styles from nearly 100 to 32. These latter sizes ranged from 7-oz. capacity to $^1/_2$-gal. capacity and are available in seven bottle styles.

When the Glass Container Section of the WPB was organized by the writer, these groups and many others placed their work at the Section's disposal, but before action could be taken, several important rules of standardization had to be developed for the user's protection:

1. Standardization could be associated only with a saving of critical materials or production time.
2. Production must be increased without widely increasing facilities.
3. Designs had to be such that any glass container manufacturer could make and any packer use them.
4. As finally developed, when a product was specified for a standardized package, all trademarked containers, whether owned by a glass manufacturer or a glass user, were to be abandoned.
5. Only those products in whose container use a net gain to the war effort was shown, were to be required to use standardized packages.

In this both the glass container manufacturer and the user gave up much. The former relinquished his ability to make special shapes and sizes of almost any design. The latter gave up the shapes that were his trademark.

It was claimed for standardization that it would increase packaging capacity to help take care of many products which were forced from more critical materials. It was claimed that it would reduce the amount of tin, steel, paper, rubber and protective coatings used for closure making. It was claimed that the lighter, stand-



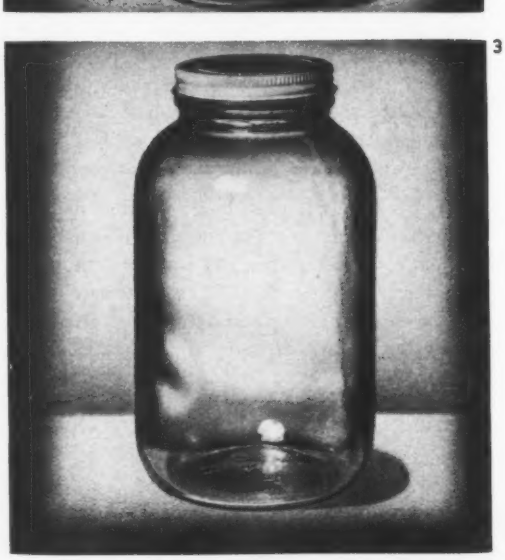
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1. Fundamental dimensions upon which all bottle shapes are based. The wood models shown here are based upon a capacity, inside the walls, of 60 cubic inches. Dimensions of the prism are arbitrary. Wall thicknesses are comparative to give approximately the same strength. They illustrate the fact that redesign of the container to give lower ratios of surface-to-volume allows for lighter weight without any sacrifice of strength. Photo Owens-Illinois Glass Co.

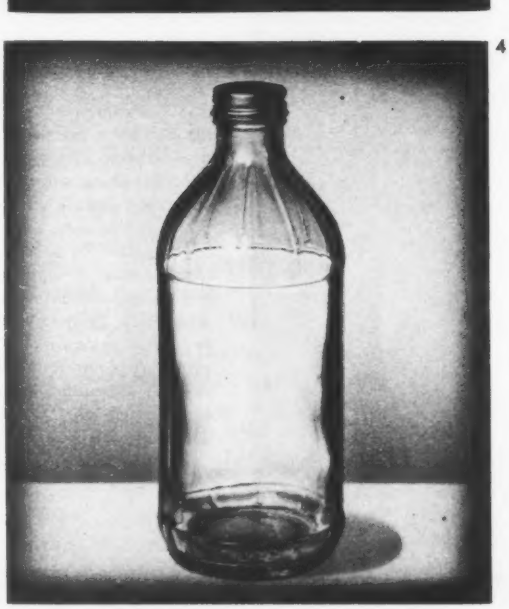
Standardized glass containers saved critical materials, lowered losses, delivered more goods. They are stronger, lighter. Here are some of the more common types. 2. Vegetable and fruit jar. 3. Plain round jar which holds a variety of products. 4. Stubby round bottle with label recess.



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ardized bottles would be stronger. It was expected that they would handle easier and faster on filling lines. The glass container industry was requested by WPB to embark upon a program with these aims in view.

Standardized bottles increase production

Figures released in October 1943, by the Glass Container Association prove the increase in production. It cannot be claimed that all the increase was due to standardization, for other technological advances have also helped. Nevertheless, the four-fold benefits of standardization (higher production speed where weight was reduced, lighter average weight, longer runs and more efficient use of molds) account for a great deal of the 13 per cent increase in production of 1942 over 1941, the 33 per cent increase in production of 1943 over 1941 and the 48 per cent increase expected for 1944 over 1941.

Among other benefits of standardization were simpler stocks, longer runs, greater quantities per carload.

When bottle shapes were standardized, sizes of opening were also reduced in order to save materials. Since the amount of metal, tin, paper and coatings used in the closure usually varies as the square of the opening (being an area function), the reduction of cap size by only 10 per cent in the diameter afforded a material savings of about 35 per cent. With lightening of tin coatings in general, and the elimination of tin in many instances, this area reduction meant that less than half as much tin was used for the same number of containers. Even though it increased their own production, users gave up enough steel to keep a small shipyard busy.

Standardized bottles deliver more goods

The same report of the Glass Container Association already mentioned has revealed an advantage expected of standardization but hitherto unable to be measured—a capacity for products beyond the increase in production. Standardization Order L-103 eliminated the smaller sizes for most products. By this means the average size container, which held 12.7 fl. oz. in 1940, has risen to 18.3 fl. oz. in 1943. Thus the 33 per cent numerical increase of containers in 1943 compared to 1941 has resulted in a 60 per cent increase in capacity. Even with these tremendous increases, many users have had such difficulties in getting glass containers that WPB has rationed certain industries. But if it were not for this 60 per cent increase in capacity for products placed in glass containers, some industries would have had no containers at all.

The foregoing has shown the wartime effort in three great directions: (1) increase in production without increase in facilities, (2) savings in war materials and (3) carrying more goods to market with fewer containers. Let us now examine some features worthy of retention.

Increased filling speeds

Experience on filling lines, no matter what the container material, has shown that a symmetrical container, such as a perfectly round shape, can be handled with the greatest speeds. When the container is oval or oblong or tapered, slow-downs and stoppages occur, with broken

or dented containers, spilled product and lost time and effort. The standardized bottles were therefore round.*

As to filling speeds, we can let a few examples tell the story. One processor who had been using a private design pint flask was able to fill about 120 cases each hour, but as soon as he changed to the Victory designs, his filling speeds jumped to 200 cases per hour, even with less-experienced help. This increase of 66$^2/_3$ per cent meant more efficient use of machinery, labor and space, and is a saving that would be lost if the postwar change should be made in the reverse direction.

Another user of glass found his production increasing from 2,300 units to 2,700 units in the same work-day, when he changed from an oblong metal container to a round glass container of the same capacity, with a reduction in losses due to damaged containers.

The food groups originally requesting the standard bottles and jars have realized the gains they had hoped for. Faced with mounting costs for labor, raw materials and all supplies, and with untrained and unskilled workers entering into all phases of the production, the standardized bottles, by their higher speeds of operation, easier handling, low losses and other benefits, have helped maintain costs in spite of the difficulties.

Lowered packaging losses

The handling of war shipments is often cited as an example of extreme harshness, yet standardized bottles have stood the test. From plasma to beer, from hospital supplies to condiments, from mosquito lotion to dishes, glass has gone all the way to combat. Whenever hospital purity or extreme corrosion resistance was demanded, glass was indicated. We are told of losses of "two bottles in 27,000 cases," "27 bottles in 60,000 cases shipped 9,000 miles."

The breakage loss on production in one distillery has been cut in half; others have done even better. One soft drink bottle, highly standardized for years, normally averages 60 or more trips per bottle, costs less than $^1/_{10}$ of a cent per customer use. Beer bottles normally average 30 or more trips and are good examples of standardized containers adopted by WPB.

With benefits in production, weight reduction, shipping space and many other factors, it is expected that standard bottles will find a permanent place in the container field. Whenever the margin of profit is small, container and use cost must be held to a minimum.

Special design bottles have their place, but they do not economically include processed or similar packaged foods, beers, soda waters, essential drugs, household supplies and similar small-profit-margin items. For the most part, wines and distilled spirits will be placed in containers that lower filling costs.

Standardized containers stronger, lighter

An engineer does not have to be told that a sphere is the strongest mechanical shape, and that a cylinder is next in line. The non-engineer who wishes to justify a non-cylindrical shape may want proof. In order to give proof, both theoretical and practical, let us quote a few formulas and actual tests. When a circular plate, as an example of the side of a flat bottle, rigidly held along its circumference, is placed under a load, the theoretical deflection is calculated by:

$$3W\frac{(M^2-1)}{16\pi EM^2t^3}\left[4a^2 - r_0 2\log\frac{a}{r_0} - 3r_0{}^3\right]$$

For a cylinder, as for a standard bottle, the maximum deflection is only:

$$\frac{0.135PR^2}{E\,t^3}$$

We need not identify the constants, or work out the problem, but the curious will find that the flat plate is badly distorted by a weight that will not measurably affect a cylinder of the same thickness and constants.

The proof of the formula is in physical tests of glass containers. Two comparisons can be cited.

In a food jar much depends upon certain relations of shoulder, side wall, neck shape and other parts, to develop the ultimate strength. A certain non-standard jar violated some of these rules of strength. On use, it gave trouble, and upon investigation it was found that the *weakest* standard jars were 60 per cent stronger than the *strongest* non-standard jars, and 125 per cent stronger than the weakest non-standard jars.

In another instance the old familiar pint whiskey flask, with one concave side, was compared with the new standard, but lighter, double convex flask. The former had always been a trouble maker, hard to make, difficult to fill, slow to handle. Tests were made to compare the impact resistance, using a 1.8-lb. steel hammer-pendulum. The average breaking point of the old bottle impacted on the concave side was 2.65 units, that of the convex side of the same bottle 6.43 units, or 143 per cent greater. Other *lighter standard* bottles ranged from 5.33 units (100 per cent stronger) to 10.38 units, (or 292 per cent stronger). These data can be duplicated.

Even so seemingly minor a detail as stippling has a function. The very light-weight, one-trip bottles used for single trip beers are stippled. Many users have disliked the stippled bottle because of an added problem in labeling, but it has been found that stippling can add 50 per cent or more to the resistance of the bottle to abuse. A light stipple has been developed to maintain strength and allow easy labeling.

Standardized bottles can be individualized

Standardized bottles need not be so regimented that they will look monotonously alike. Metal food containers have been standardized in shape for years—yet label treatment makes each one different. Attention is drawn away from the shape of the glass container, and placed both on the label treatment and the contents of the bottle. A glass container is a "view container" whose contents reveal themselves at the point of purchase. A simple glass design becomes a show case.

* See "Designing for the Production Line," p. 70.

Handmade glass bottles



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1. Unusual triangular shape in a clear, hand-molded glass perfume bottle. 2. Intricately molded atomizer bottle with radiating lines for crystal-like sculptured effect. Closure is of gold-colored metal. 3. Simple bottle of pyramid shape. Bottom and neck are fully annealed for maximum strength. Glass stopper has distinctive ringed design. Bottles like these are made of carefully selected materials entirely free from impurities. Photos Kimble Glass Co.

For the manufacture of the great majority of the glass bottles employed in current packaging operations, modern automatic machinery is used. Glass is made in immense furnaces with materials which are mixed by the ton. The molten glass is then fed into huge automatic machines and blown accurately to conform to the shape of the molds within the machine.

However, the ancient art of glassmaking still occupies a prominent—and in some respects an increasingly important—place in the packaging picture. The most interesting of the handmade glass bottles are of the so-called private mold design.

Where extremely fine work is essential, and where limited runs of such work are required, handmade and semi-handmade glass containers are widely used. Such containers are particularly applicable in the perfume, talcum, bath salts, prescription, wine and liquor and other similar trades.

Until the start of hostilities in Europe, a limited quantity of French, Australian and Czechoslovakian glass falling into these categories was imported each year. Since September, 1939, however, American manufacturers of handmade glass have shown their ability to meet all the needs of the market, and virtually no dislocations have occurred due to the cutting off of former imports. In fact, the probability may now be clearly seen that no extensive import trade will find a basis for existence after the cessation of hostilities, since domestic producers have so clearly demonstrated their ability to meet domestic requirements successfully.

Manufacture of handmade glass

In the process of making a bottle by hand, the glass blower inserts the blowpipe, an instrument about 4 ft. long, into the pot of glass and withdraws a sufficient

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amount for the bottle, at the capacity required. A hand skilled in feeling the weights is imperative, as too much glass would decrease the capacity of the bottles, while too little would increase the capacity, besides making it too frail for average handling.

The glass is then rolled on a smooth flat surface to eliminate any wrinkles that may have formed while the glass was being taken from the pot, leaving an almost perfect piece which is placed in an iron or steel mold. The mold is made in two parts, each containing a cavity of a size equal to half the size of the bottle. There is a bottom plate for a base.

When the mold is closed around the glass, the blower sends sufficient wind through the pipe to spread the glass evenly against the walls of the cavities, forming the bottle. The mold is opened immediately and the bottle is taken out with pincers, and weighed. The necks are reheated so that a smooth open mouth and a proper finish can be formed with a tool.

If the bottles are allowed to cool rapidly, they become extremely brittle, causing them to break from the least vibration, so they are placed in slow moving lehrs that cool them gradually, giving them the proper temper.

The bottles that pass inspection have their stoppers ground-in and tied to the necks to insure against the possibility of interchanging, which would cause leakage and evaporation when the bottles are filled with perfume.

While this description of the process is basic, it is susceptible to virtually infinite variations to meet the very specialized requirements of differing designs. For instance, handmade bottles with threaded necks have recently been placed upon the market. These necks are made accurately in accordance with Glass Container Assn. specifications to accommodate standard metal or plastic closures. Thus the container partakes of the advantages of the hand-blowing process, while at the same time achieving a uniformity of closure finish which is most commonly associated with the automatic glass-producing equipment.

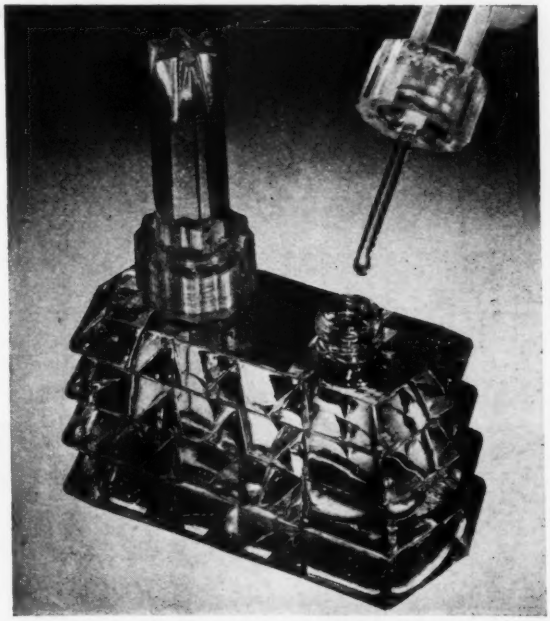
Glass for hand-blown bottles is usually made of very carefully selected and blended materials fused in small batches in covered pots free from the impurities of factory air. Extremely delicate and sparkling effects can be achieved because of the high quality of the glass utilized, as well as because of the interesting effects in design attainable by hand-blowing operations when they are performed by skilled workmen.

Private vs. stock molds

The factor of difference in cost between containers from stock molds and from private molds shows a situation for hand-blown bottles quite different from that for bottles made by machine. Since only one mold is used by each blower, and since hand-blown bottles are produced in relatively short runs, the cost of molds for private-mold bottles is generally lower when they are made by hand. This factor alone, however, would seldom be sufficient to swing the decision one way or the other in favor of hand blowing as against machinery for the making of bottles.

4. A two-cavity hand-blown bottle with dual closure finishes and plastic stoppers with glass applicators. 5. Hand-blown bottles with handmade glass stoppers. Bottle at the right has recessed and extended panels. 6. Handmade bottles equipped with threaded closure finishes. The decorative, unusual closures are made of metal. Bottles of the type illustrated are produced in relatively short runs. Photos Carr-Lowrey Glass Co.

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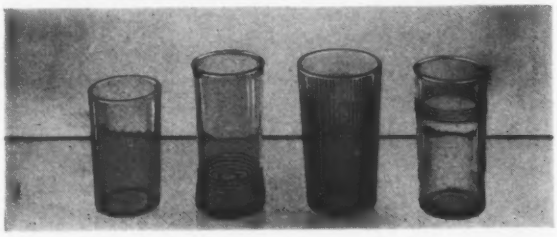
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Tumblers as packages

by Frasier Smith


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Re-use feature makes tumblers important packages with big postwar future. 1 and 2. Variety of shapes available with private molds. 3 and 4. Applied color can be most effective for re-use packages. 5 and 6. Stock molds offer the packer a wide choice. Photos Hazel-Atlas Glass Co.

In the years preceding America's entrance into the war, the tumbler had gained considerable popularity as a food container. However, due to the high ratio of closure material to tumbler capacity—and the consequently greater use of war-scarce metals when compared with standard packers' jars—wartime shortages of certain metals have led to restrictions on the use of tumblers for certain products. There are few products for which tumblers are unsuited, for they have been used in packaging processed cheese, cottage cheese, jelly, jams, peanut butter, salad dressing, horseradish, soup mix, cocoa, tea and shoestring potatoes—this list could be extended.

Many attractive designs in a wide range of capacities will be obtainable from stock molds; and when the quantity used justifies it, a special design may be evolved. Also a number of efficient closures are available, both side and top seal for either band or bead style finishes used with or without vacuum.

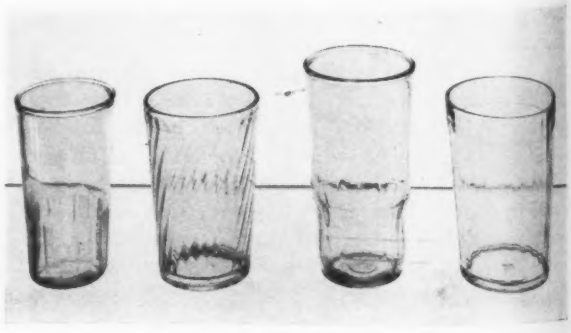
The tumbler's chief claim to packaging consideration, of course, lies in its adaptability to re-use. This re-use takes two forms: first, by the obvious employment of the empty container as a drinking glass; secondly, as a container for homemade jellies and jams. In many cases, these tumblers may be so attractively designed as to make their use acceptable to housewives of considerable discrimination.

The application of intelligent, imaginative design, with due consideration for the nature of the product to be packed, may add much to the sales appeal of the package and to its subsequent acceptance as a piece of useful everyday household equipment.

There are two principal approaches to this merchandising problem. Variation in form and ornament may be incorporated into the molds, or decoration may be added in the form of applied color, usually fired on to become an integral part of the tumbler, unaffected by water, heat or ordinary wear. This color may cover the entire surface, or may be applied in a variety of patterns.

The obvious appeal of the re-use features appears likely to insure for this type of container an important place in the postwar packaging picture.


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Specialized glass containers

A whole group of glass containers, widely varied in appearance and in application, is fabricated on precision machines from machine-drawn glass tubing. Modern methods result in evenness of wall and freedom from distortion of vision without sacrifice of strength.

Glass vials are widely used for packaging liquids, powders and tablets when a small, convenient and light container is required.

Glass ampules are accepted in pharmaceutical practice as the best, and often the only, practical means of providing utmost convenience combined with absolute sterility and maximum protection over an indefinite time.

Standard types such as those illustrated are ordinarily available from manufacturers' stock. Special requirements, of which there are many, can usually be met with little difficulty or extra cost, as the machines used for fabricating these articles are remarkably adaptable. Thus a considerable range of special sizes, designs and finishes is available on order and special glass may be obtained for special requirements. Vials can be made with flat or oval bodies, with round bottoms, open at both ends, with neck finishes modified to take a variety of closures. Ampules of special styles, tolerances and sizes are often manufactured to order.

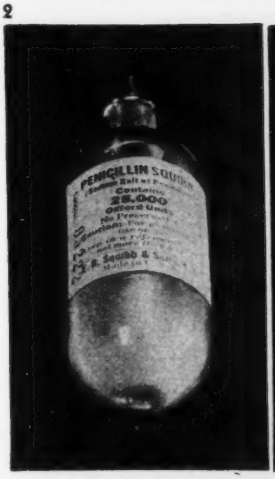
Glass vials and ampules offer attractive possibilities in labeling. Metal or paper may be used, or the design and inscription may be printed directly on the glass itself. If permanency is desired, colored ground glass in suspension may be fused into the vial surface.

Some special applications are interesting. Ampules especially have come into wide use among our armed forces and elsewhere as a convenient means of distributing small portions, not only of drugs, but other liquids. New research and design have triumphed in meeting new

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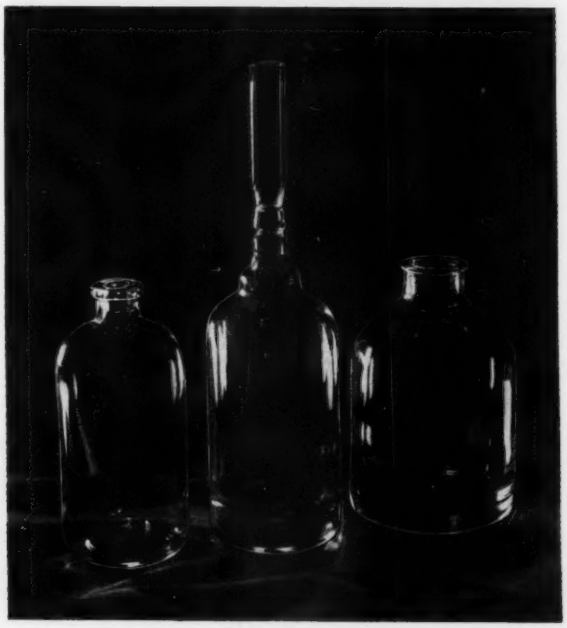


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1. New method for such printing directly on ampules will be commercially available after the war. Photo Decorated Containers Co. and Harris Laboratories. 2. Bulb-shaped ampule holds 25,000 penicillin units. Photo E. R. Squibb & Sons. 3. Ampule with constricted neck. Photo Merck & Co. 4. Containers hold blood collected from donors; plasma-extraction process follows. 5. Giant ampules hold 100,000 penicillin units. Photo Chas. Pfizer & Co., Inc.

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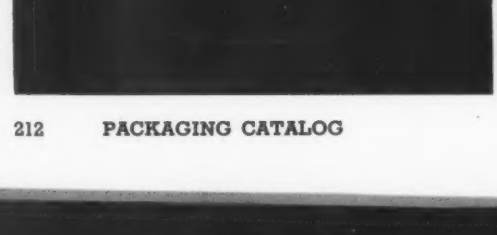
and highly specialized demands. A long vial of small diameter with a special finish makes an admirable iodine applicator. Vials and tubes with a closure at each end and a division in the middle have been developed to contain two different chemicals intended for mixing at the moment of use, as in photography. Sealed glass tubes make individual sterile containers for sutures and ligatures. Vials or small glass tubes are sometimes used as inner containers in more or less complicated assemblies. A simple and familiar example is the library-paste jar which utilizes a glass vial as a water and brush well.

Blood plasma has been established as an essential in the medical profession. The armed forces are requiring huge quantities, and hospitals and civil authorities are taking care to have sufficient supplies available.

Whether for military or civilian use, blood is collected from volunteer donors, and the plasma is prepared in the same way for both military and civilian needs. The bottle at the right in illustration 4 is the type used almost universally, for collecting blood and for the initial steps in the processing. Military authorities have set up standards for the bottles used to contain the prepared plasma and the distilled water which must be available at the point and moment of use. A bottle of this type is shown at the left in illustration 6. Commercial firms supplying hospitals and other civilian customers use containers made to their own specifications. The center bottle in illustration 4 is in extensive commercial use to contain prepared plasma and distilled water.

Penicillin, one of the latest and most widely publicized developments in the medical field, has demanded unusual types of glass containers. Absolutely sterile packaging operations are most imperative for this product. Although no unified method of packing has been adopted or specified, glass is the accepted container. Leading producers use flame-sealed ampules or sealed vials.

6. Shell vial, basic form of the vial family. 7. Patent lip vial is used with cork or rubber closure. 8. The screw-cap vial uses a metal or molded-plastic screw closure. 9. Ampules, made of glass tubing in various sizes, may be modified to meet special needs. Photos Kimble Glass Co.



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XUM

Closures - finishes - liners

A glass container, considered as a package, is as successful as its closure, and the closure depends upon the finish of the bottle or jar, the closure form and fit, and the seal effected by the liner of the closure.

The *finish* of a glass container is the region designed for the application of the closure. It is so called because, in the old hand-blowing days, it was the last part of the bottle to be shaped.

Since this finish is the bridge between the glass bottle industry and the closure industry, it is obviously essential that the dimensions of the finish be common property of both manufacturers. For this reason, the Glass Container Association has standardized every type of commercial finish for which closures are made, and the specifications of these finishes are available for the guidance of all producers of glass containers and closures.

These finishes may usually be applied to bottles of any design. So far as the prospective purchaser is concerned, all he has to do is to determine the type and size of bottle or jar he desires and the type and size of closure. When the shipments of glass containers and their closures arrive at the plant, the GCA standardization of finishes makes possible an accurate fit.

Approximately one hundred finishes have been standardized. These are designed for all commercial closures. In the following section describing the closure field, it may be taken for granted that the proper finish is in the hands of the glass manufacturer.

Types of closures

Primary closures—The primary closure of a glass package is the one that has any portion of its inner surface exposed to the contents. Its function is to seal the bottle and to remain securely in place until the consumer opens it. Every primary closure comprises:

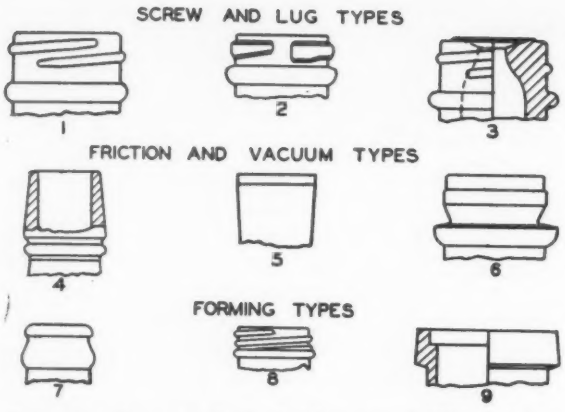
1. A sealing surface, to be pressed against the sealing surface of the container
2. A cover portion for the mouth of the container
3. Some means of securing closure to container

The sealing surface of a closure is usually a gasket or liner (that is not affected by the product) backed with a compressible material which will conform to the contour of the sealing surface of the container. The gasket may be a single material which combines both the "product resistant" qualities and cushion (compressible) qualities—for example, rubber, cork, etc.

The first thing the packer must know about his closure is whether it provides the degree of sealing required by the product. Properly applied, a closure may be airtight, liquid-tight or simply siftproof. It may be designed to hold internal pressure of varying amounts, to vent and re-seat after venting, or to hold a vacuum. The degree of sealing depends primarily upon the nature of the material used for both liner and backing and the pressure exerted by the cap on the liner.

Types of closures may be more clearly discussed by classifying them according to the methods used to secure them to the finishes. The sealing surface of the bottle may be on the inner surface of the neck, on the top of the neck or on the outer surface of the neck. Therefore, closures are designed for inner seal, top seal or side seal. The *inner* seal is formed at the inside periphery and below the inner edge of the container mouth. The *top seal* is formed on top of the container rim. The *side seal* is formed on the outside periphery and below the outer edge of the container mouth. Thus classified, closures fall into five types:

1. Friction closures: These, forming inner seals, may be tapered, groud-surface, glass plugs. The most popular friction closures are cork stoppers. They may have straight sides (wine and whiskey), tapered sides (miscellaneous jugs and flasks), champagne style or cored for use with sprinkler tops or applicators. The corks may have tops of plastic, wood, metal or wood covered with metal. Side seals by friction only are most common on tumblers. On jars, combinations of side friction and vacuum are frequently used, and the glass finish is often provided with a ledge for pry-off opening. Vapor vacuum, steam vacuum or other vacuum-sealing processes often combine friction side-sealing with the vacuum sealing.
2. Screw closures: May be deep or shallow caps, the deep screw having a skirt about one-third deeper than the shallow. They may be single shell, with the threads exposed; double shell, with the threads concealed in an outer casing; or the outer casing and concealed thread may be made of a single piece of metal. They may be of metal, or plastic, or both; in this time of shortage of critical materials, wood, compressed paper pulp and clay are also undergoing experimentation to develop commercial screw closures made of them. The caps may be knurled, semi-knurled or unknurled. The skirt may have an outwardly rolled edge, a raw edge or a turned-in rolled edge. The top may be domed, partially domed, flat, or have a depressed ring. Lug caps are variations of screw caps, since the lug acts as an interrupted thread. The lug may be made by indentations in the skirt, or by turned-in projections on the edge of it.
3. Formed closures: The most familiar of the caps formed on the finish of a bottle is the crown cap, used for beer, carbonated beverages, condiments. Another type of formed cap is the *roll-on*—a piece of ductile metal in which the threads are formed by



Representative standard finishes for bottles of any design: 1. Shallow continuous thread. 2. Two lug Amerseal. 3. All glass sprinkler top. 4. Brandy cork. 5. Tumbler friction. 6. Deep friction "pry-off." 7. Crown. 8. Roll-on. 9. Band. Drawing Glass Container Assn.

the capping machine (during cap application at the packer's plant) to conform to threads on the finish of the bottle. Another type of formed cap is the chuck-crimped type where the chuck on the capping machine collapses or squeezes the skirt of the cap, or the gasket in it, against the side-sealing surface of the finish.

4. Vacuum only: Caps, under which vacuum may be obtained by special sealing machines, by cooling and contraction of hot packed product, or by some combination of these methods.

5. Miscellaneous and combination caps: The band-cap is an example of this type. It is one in which a metal band applied with a sealing machine has its lower edge crimped under a ledge on the container finish and its upper edge crimped over the top corner of a sealing disc or cover, which often is also held under vacuum. Bands in the form of a tear-off, or separate removable band around the finish of a container, are often used as supplementary seals to hold a cover cap in place and prevent it from accidentally becoming loose. When made an integral part of the primary closure it makes it tamperproof.

Many further variations of the other four main types have been developed for specific products. The packer is sure to find several competing types which are appropriate for his product and package.

Secondary closures—A secondary closure is one that does not come in contact with the glass-packed product. It may be used: (1) as a dust cover to keep the whole neck of the bottle or jar clean for dispensing purposes, (2) as a cover for whatever part of the product remains in the container after the primary seal is removed, (3) as a decoration to "dress up" the package or (4) to hold the primary seal in place on the glass finish, (5) to prevent tampering.

Among the secondary closures are the so-called cover caps, frequently used to protect the primary closure or pouring edge of a bottle. Many milk bottles have cover caps of paper or (formerly) aluminum foil, and distillers often used a hood of gold or silver foil over the cap to dress up the package. Catsup cover caps made of tinplate are used as covers for partially filled bottles after the primary closure such as a crown or formed cap has been removed. Many secondary closures are made of cellulose cups, either opaque or transparent, sealed over the primary cap on the finish.

In this classification also fall a variety of tamperproof closures, usually metal strips which bind the primary closure and must be destroyed before the bottle can be opened. Here, too, is the cellulose disc applied inside the primary closure, secured by an adhesive to the sealing surface of the bottle.

The virtues of packaging in glass under closures are too well known to require further description. For the proper type of closure and glass finish to specify for a given set of packing conditons, consult the manufacturers of closures and glass containers.

Government limitations

It would be impossible in an article of the present scope to include complete details as to closure limitations imposed by the War Production Board nor would it be practical to reproduce the orders because they are continually being amended. Users and makers of closures should keep informed about these orders and their latest amendments. The various orders have effected conservation by the following methods:

Reducing sizes of closures
Eliminating smaller packages
Eliminating and/or reducing tin coatings
Eliminating and/or reducing rubber for sealing
Eliminating and/or reducing use of steel
Conservation in use of protective coating materials

Substitute closures—It is not easy to find satisfactory materials from which substitute closures can be made. Here are some of the hazards:

1. Tolerance requirements of glass make a yielding cap and cushioned gasket material necessary.
2. There must be a means for mechanical adherence of the closure, by vacuum, friction, threads, lugs.
3. "A closure must hold until it is ready to be removed, then it should come off easily."
4. Closure materials should not be appreciably affected by moisture.
5. The finished closure, if of a screw type, should be able to withstand a torque of from 15 to 40 in.-lbs. without break or distortion, and should be removable with about the same amount of force.

The search for substitutes

The perfect closure of the past depended on the three now highly critical materials—metal, plastics and rubber. Except for high priority products, comparatively few items of merchandise are now permitted to use any of these three. As a result, there was a search for substitutes.

The crown cap presents a most puzzling problem. Limitation orders have reduced the allowable quantities of metal for carbonated beverages and brewers, and the user must restrict himself to existing machinery and to the use of types of closure which can be applied economically on present packaging lines. That stipulation excludes many otherwise excellent suggestions. Tests are still being conducted by brewers and carbonators. The former will have a tougher time than the latter because of the pasteurizing process. This process lasts about 45 minutes, raises the temperature to approximately 150 deg. F. and increases the pressure to approximately 90 pounds—all of which has played havoc with plastic and fibre caps so far developed.

Better luck has been experienced in developing screw caps of paper, glass, ceramics and available plastics. Even cork and wood—at one time the only known closure materials—are being pulled back into service. Although several concerns report having abandoned projects that at one time looked very good, and others tell of direct war work interfering with closure production, the situation is beginning to look hopeful.

Paper closures that fit over a round edge glass jar have extended their usefulness in connection with quite a few products such as cleansing creams, jellies and processed cheese. These closures are made of bleached sulphite or molded fibre, treated so as to be grease-resistant, and a seal is formed with wax.

Coffee is on the market with several different types of paper caps. One of these is a screw cap with a continuous thread which, it is claimed, goes through the packaging line with no trouble, forms a tight seal on the jar and also has re-use possibilities. Another is a slip cap with a secondary closure of viscose to make a tight seal.

At least one successful paper lug cap is on the market. This is on a wide-mouthed tobacco jar and is made in two sizes.

The glass manufacturers are playing around with closures mostly of the lid type, though some report success with screw, shell and lug types. The difficulty here lies in the need for a gasket. So far it seems to be accepted that glass-to-glass cannot form a perfect seal.

Ceramic closures are appearing which may solve the problem for some products. One company reports having successfully made screw caps of ceramic materials in sizes from 22 mm. to 89 mm., glazed or unglazed in about 60 different colors. They are suitable for high-priced products, and to that degree may release critical metals and plastics, but the makers of low-priced, low-margin products cannot regard them with much hope.

When plastics are mentioned for packaging, the question should always be asked "which plastic?" The ureas, the phenols and the styrenes are all under restrictions for civilian packaging and the situation regarding their availability is unpredictable at any given moment. Acetate, which is less critical, is soluble in a variety of agents and are only suitable for grease-base products.

The supply of cork is much less critical than it has been. Probably the biggest user of cork for closures is the hard liquor industry but its consumption has been considerably reduced due to the fact that most of the distillers are devoting their entire capacity to alcohol production for direct war purposes.

Closures of wood are suitable for some products but most of them require some kind of a secondary seal. There are screw caps and stoppers of wood in existence but a difficulty seems to lie in securing uniform production and sometimes in preventing the "warp."

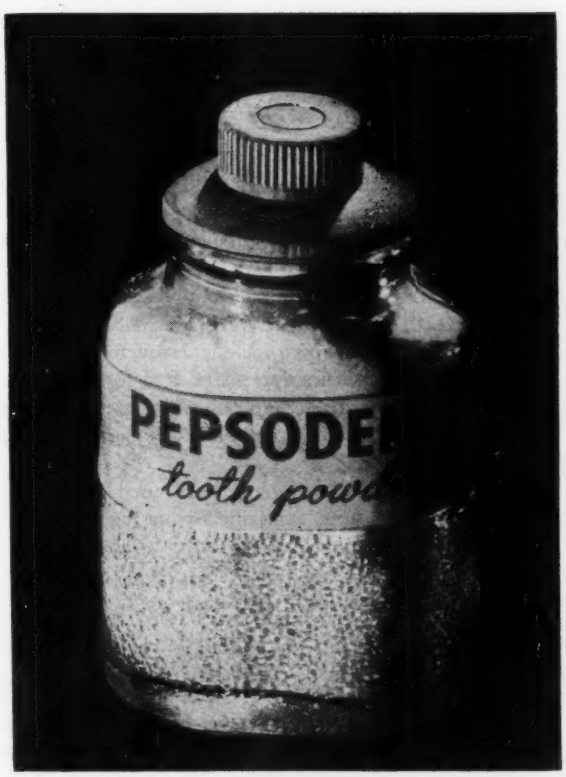
Liners and sealing compounds

The liner manufacturers are suffering from a shortage of manpower; the demand for liners has considerably increased; there, of course, is a scarcity of oils and resins for producing the varnished-paper type of liner; those made from rubber, such as Panaseal and Raolin, are not obtainable. Vinylite has been needed for essential war uses, and only a limited supply has been available for essential closure needs, although some of this material is expected to be available soon. A new lining material produced from Moroseal was introduced in 1943. This material is somewhat similar to Vinylite, being made from vinyl chloride, whereas Vinylite is produced from the copolymer of vinyl acetate and vinyl chloride. The Koroseal material can be used to replace Vinylite, and for all practical liner purposes is equivalent. Liners produced from pure gum rubber or those with natural rubber as a material are no longer available.

Liner materials now available include the following:

Regular Yellow Varnish Paper—Used on food prod-

Wartime package for tooth powder uses "dual top" closure with cork stopper and removable cap. Photo Dodge Cork Co.



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ucts, such as peanut butter, mayonnaise, prepared mustard, salad dressing, as a spot for crowns, especially for soft drinks and on pharmaceutical and household products.

Black Alkali Paper—Primarily developed for milk of magnesia use, although this material finds general acceptance for many pharmaceuticals and certain dry chemicals. Black Alkali has been used on liquors, although it is not as good as Vinylite or Panaseal for this use.

Pale Yellow Varnish Paper—This paper is generally not quite as resistant as the Regular Yellow and is used where the particular customer desires a lighter liner.

Harvel—This special paper has been used for products containing certain types of solvents and has been used on liquid deodorants and certain shoe polishes.

Whiteseal—Whiteseal currently has been used as a substitute for tin foil in sealing products containing organic solvents. It is not nearly as efficient as tin foil, although it is being used as a substitute for foil at the present time. Whiteseal is likewise being used currently on liquors, face creams, cold creams, and other products, as a substitute for Vinylite or Panaseal.

Of the varnished papers, Black Alkali paper is probably the most universal of all of the varnished papers and could be used quite generally. Its dark color has been the main reason why it is not used on many more food products; for instance, it could be used satisfactorily on peanut butter and mayonnaise. However, the regular Yellow Paper is more nearly the color of the product; consequently, it seems to be more acceptable.

Vinyl resin copolymer is under restriction but is available for foods and pharmaceutical products in reasonable quantities.

Rubber hydrochloride sheeting has an appearance quite similar to the preceding but, in view of the scarcity of rubber, is not at present available for closures.

Cellophane is widely used for liners where resistance to solvent action is required. Available today for food and health items only.

Nitrate and acetate films have been used in the past but in relatively small quantities. They are continued in use today but confined sharply by a limitation order.

Plastic wax liners, consisting of pulpboard with a heavy coating of plasticized wax, have been widely used in the past on food containers. From present indications their use is still possible in all quantities.

Newly developed papers include lacquered glassines and papers coated with solutions of urea formaldehyde and various resins. These papers have their uses where normal oil papers would be soluble. They are available in limited quantities.

Glass-fibre liners which have been used in limited quantities are not now available except under special circumstances. Generally speaking, there is high priority on them and they may be used only for sealing of concentrated chemicals, particularly acids.

Structure of liners

Liners may be divided into two classes; namely, simple and duplexed. By simple liners is meant a liner of a single material, treated or untreated. A duplexed liner consists of a backing faced with a material which is resistant to the product, the backing being used to support the facing and to take up the space between the sealing lip of the container and the closure so that a tight seal is made. The facing is generally adhered to the backing.

SIMPLE LINERS

Pulpboard	White felt
White waxed paper	Waxed saturated pulp
Saturated pulp	Plastic wax
Natural cork	Rubber (various types)
Cork composition (various types)	Special solvent (various types)

DUPLEXED LINERS

BACKINGS	FACINGS
News board	Waxed paper
Pulpboard	Varnished paper (various types, Silite, etc.)
Cork composition	Vinylite
White felt	Panaseal or Raolin
Tan felt	Metallic foils—tins
Gray felt	Aluminum and lead

Plain pulpboard and white felt can be used for retaining products which are dry and non-hygroscopic. For powders, pills or capsules, which are only mildly hygroscopic, a white waxed paper, saturated pulp or waxed saturated pulp is indicated. Cork composition (either plain or waxed) will protect hygroscopic products, and finds quite general use in the narrow-mouth package field. Rubber or rubber substitute liners are quite generally used for alkaline products, such as household ammonia, the hypochlorites, mild acids, tincture of iodine and cuticle remover. A pure gum rubber (minimum amount of free sulphur) is generally supplied for solutions to be used for injection purposes.

In addition, special liners have been developed which are resistant to solvents. They may be used in caps with posts or wells where a washer-type liner is indicated and are used on corn cures, nail polish, solvent adhesives.

Duplexed liners consist of a backing and a facing and are the liners most generally used for closure purposes. The most common backings consist of pulpboard, newsboard or cork composition. In metal caps, double insertion is often used in which the backing and facing are not combined, but the superimposed materials are punched directly into the caps. In molded caps it is customary to adhere the facing to the backing with a tasteless, odorless adhesive.

Several different grades of cork composition can be supplied. Cork particles may be either large or small in size range and different degrees of resiliency may be produced by using dense or less dense compositions.

As a guide for the study of available liners which might be used, the accompanying table will indicate a possible selection. Liners formerly used are indicated by the letter "F." However, it should be remembered that each product should be subjected to proper laboratory tests before a substitute liner is used.

There is really only one good way to determine

whether a liner will work and that is to conduct actual tests. The products which are official in the British Pharmacopoeia or in the United States Pharmacopoeia and National Formulary could be studied in the laboratory, and a definite liner recommendation made, providing some one cared to take the time and spend the money. It would not be possible to make a general recommendation for the non-standard or unofficial products. Likewise, it would be foolhardy to attempt to make a general recommendation for liquid glues. Some of them are alkaline in their nature, some of them natural, others acid, and since glue is a general term for adhesives, the solvent type of adhesive, such as cellulose nitrate, might be classed under the same category. The cellulose nitrate types, being a solvent solution, require a metallic foil as a liner (currently Whiteseal as a substitute), while the acid animal glues would definitely corrode the tin foil. Here Vinylite, or possibly Black Alkali Paper (if the acid is not too strong), might be used.

It is a general practice to conduct accelerated tests on the various lining materials. These consist in using a one-ounce bottle with 28 mm. finish. Caps are lined with the test materials. About $^1/_2$ ounce of the material under test is introduced into the bottle and the cap is applied with a standard tightening force of 33 lbs. tangential pull or 17.9 torque inch-pounds. Duplicate sets are put up and are then subjected to elevated temperatures, one bottle in upright position and the other in inverted position. A temperature of 150 deg. F. is used for the products which are not volatile. The volatile solvents are held at 120 deg. F. both in upright and inverted positions. After an exposure of 48 hours, the samples are removed from the oven and permitted to come to room temperature, after which they are visually examined to note what action has taken place and the liner then scratched with the fingernail to determine whether the facing has been softened or not. Moisture transmission tests are conducted in the standard manner.

Other characteristics of the papers, such as resistance to blend, brittleness, uniformity of coating, of course, must be evaluated. The paper must have the ability to be properly attached to a backing material, such as pulpboard or newsboard or to cork composition with the various types of adhesives commonly used.

Suggestions for Liners or Facings

	Varnished paper	*Tin foil*	*Silite white seal impervite*	*Vinylite*	*Panaseal Raolin*	*Waxed paper*	*Rubber or substitute*	*Special*
Dry Powders	XF	..	X	F	F	XF	..	..
Mineral Acids:								
Concentrated	..	..	..	..	..	..	..	XF
Weak	..	..	..	?F	?F	..	..	..
Alkalies:								
Concentrated	..	..	..	..	..	..	X	..
Weak	..	..	..	?F	?F	..	X	..
Solid	..	..	..	?	?F	?	..	..
Alcohol:								
U. S. P.	X?	F	..	XF	F	..	..	..
Denatured	X?	F	X	XF	F	..	..	..
Bleaching Solution	..	..	..	XF	F	..	X	..
Adhesives:								
Liquid	X?	..	..	F	F	..	..	X
Solvent Type	..	F	X	..	..	..	..	..
Cosmetic Creams	X	..	..	F	F	?	..	...
Corn Cure	..	..	..	..	..	..	..	X
Foods:								
Dry	X	..	X	F	F	X	..	..
Olive	X	..	..	F	F	..	F	..
Relish	X	..	..	F	F	..	F	..
Mayonnaise	X	..	..	F	F	..	F	..
Processed	..	..	..	..	..	..	X	..
Liquor	X	F	?	F	F	..	..	..
Nail Polish	..	F	X	..	..	..	..	X
Nail Polish Remover	..	F	X	..	..	..	..	X
Oils:								
Animal	X	F	X	F	F	..	..	..
Mineral	X	F	X	F	F	..	..	..
Vegetable	X	F	X	F	F	..	..	..
Essential	..	F	X	..	..	..	..	X
Organic Solvents	..	F	X	..	..	..	..	X
Perfume and Toilet Water	?	F	X	..	..	..	..	..
Pharmaceuticals	?	?F	?	?F	F	..	..	..
Wine	X	.	..	F	F	..	?F	..

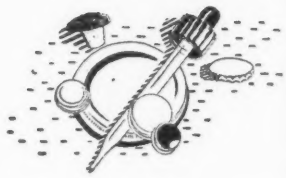
F—Formerly used.
X—Facing can be used with these products.
?—Liner probably can be used.

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PICTORIAL REVIEW

Metal Closures
Screw Type





1. 45-mm. continuous-thread closure, full dome, no knurl, wire edge.
2. G deep screw closure, flat top with sealing bead, knurling, interrupted thread, wire edge.

3-4. 28-mm. and 45-mm. continuous-thread closures, flat top with sealing bead, knurling, wire edge.

5. G 2-piece deep screw closure, gasket-lined disc (lithographed for sale as a home-canning closure).
6. 60-mm. continuous-thread closure, flat top, no knurl, turned-in wire edge.

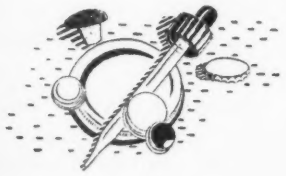
7-8. Continuous-thread closures with indentations to permit venting of internal pressure.

9. G deep screw closure, flat top with sealing bead, knurling, wire edge.
10. One-piece straight-side closure with continuous thread in turned-in skirt ("Unishell").
11. 63-mm. continuous-thread closure, flat top with sealing bead, knurling, wire edge.
12. Semi-double shell continuous-thread closure (shell with threaded band in skirt).

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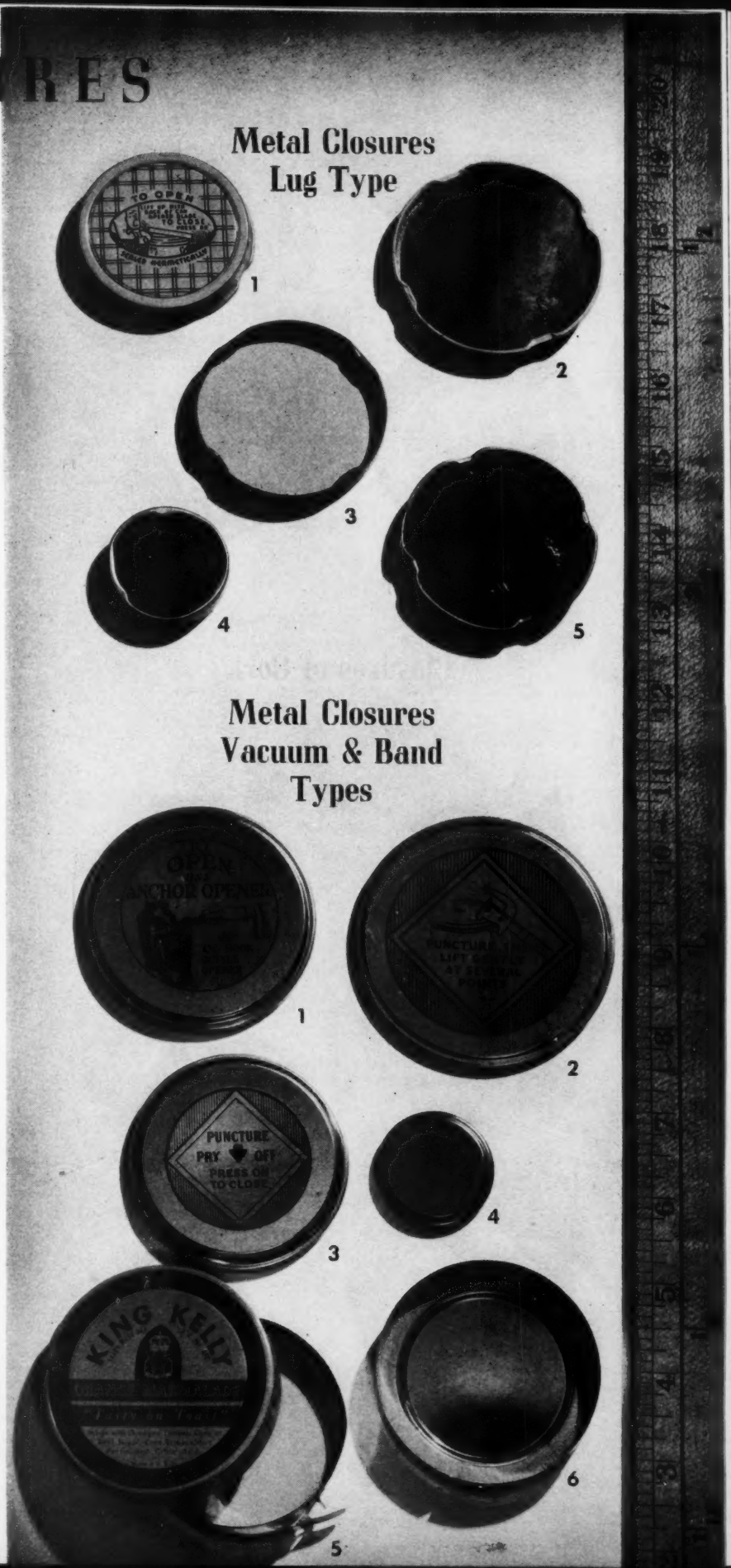
OF CLOSURES

1. Closure with lug indentations which form vacuum pry-off finish, effecting water-tight re-seal.
2. Lug closure, flat top with sealing bead, knurling, wire edge (closure inverted to show waxed oil paper liner).
3. Lug closure, flat top, straight side, turned-in edge (inverted to show pulp and vinylite liner).
4. Lug closure, flat top, straight side, turned-in edge (inverted to show pulp and oil paper liner).
5. Lug closure, flat top with sealing bead, knurling, wire edge (inverted to show cut rubber or composition sealing gasket).

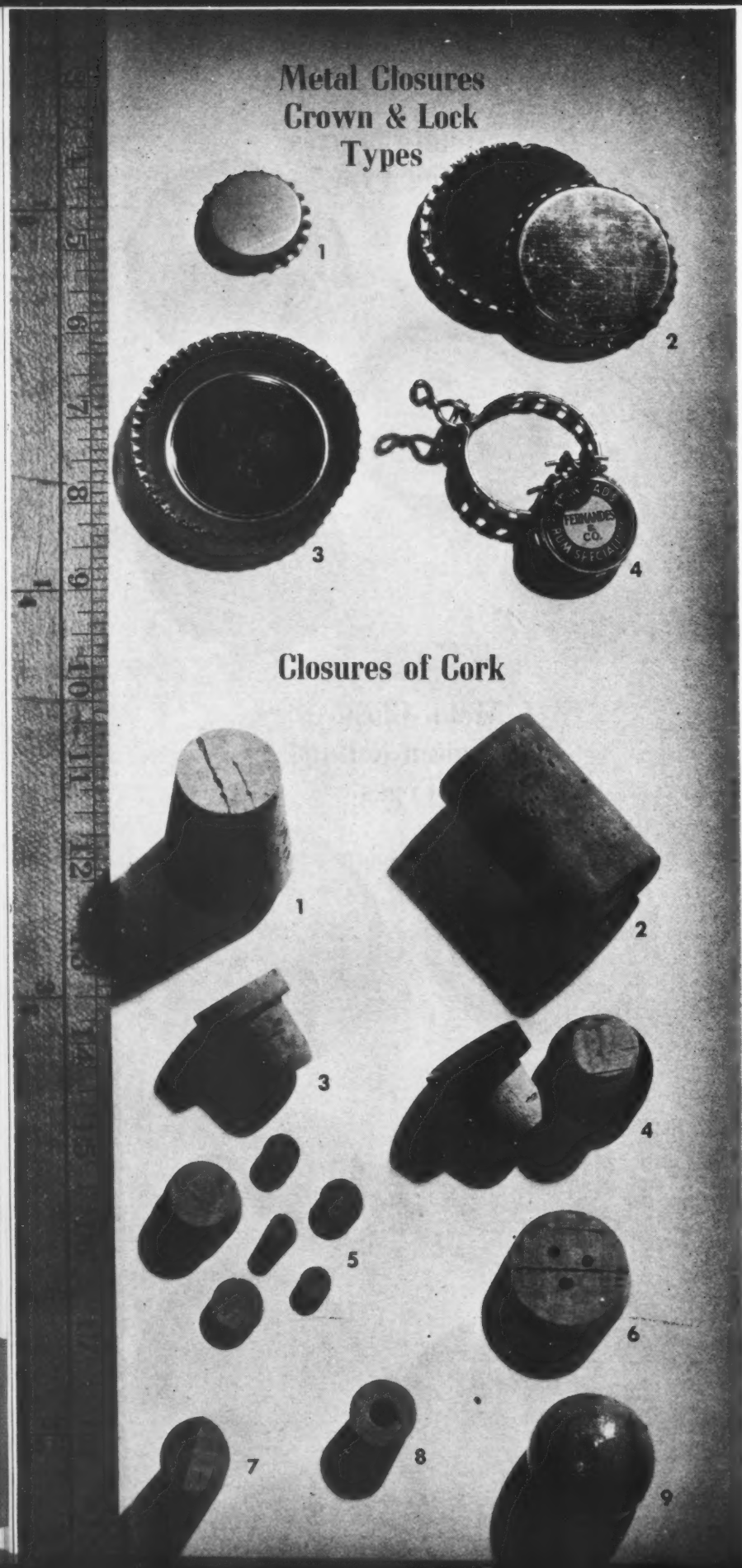


1. Side-seal closure for jars and tumblers.
2. Side-seal closure for thin blown or light pressed tumblers.
3. Side-seal closure, pressed-on type for jars.
4. Side-seal closure for lubricating oil containers.
5. Band closure consisting of disc and tab locked band (one closure inverted to show interior and band lock).
6. Band closure (inverted to show flowed-in sealing compound in disc).

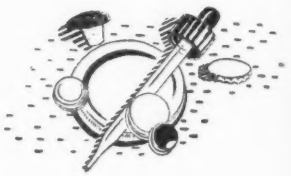
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1. Crown cap (used extensively for non-alcoholic and malt beverages).
2. Crown caps (large sizes for bottles and jars).
3. Crown cap with deep skirt and flowed-in sealing gasket.
4. Lever-lock closures (lifting lever permits hand removal of closure).

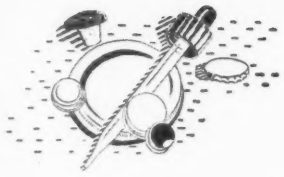


1. Tapered cork in general use for bottles, jugs, flasks, etc., made in a wide range of grades, tapers and sizes.
2. Champagne cork, over-size, driven into bottle under compression, making it assume cylindrical shape.
3. Cork flange-top closure, shape facilitates removal; used on whisky and products requiring tamper-proof outer seals.
4. Cork closures with flange top, synthetic substitute for embossed wood- or plastic-top closure, for wine and whisky packages.
5. Group of small cork closures for vials, ampules, etc.
6. Closure for laboratory use with apertures for pouring tubes, etc.
7. Wedge-top cork (ordinary tapered cork with formed top). Widely used for perfumes and cosmetics.
8. Cork with aperture for sprinkler or dispensing top.
9. Cork-knob top for cork closure.

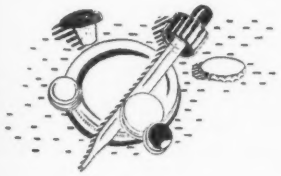
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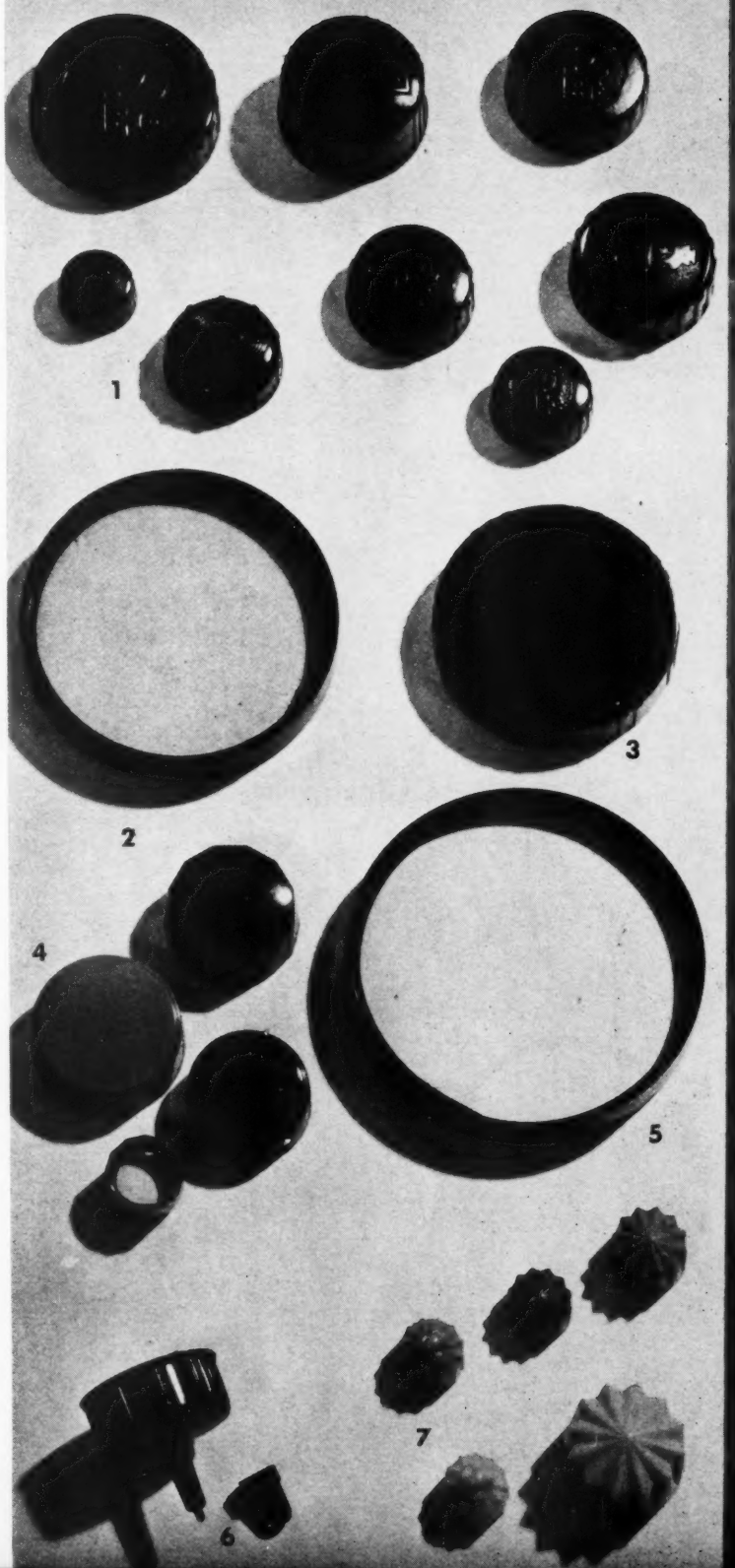


1. Plastic continuous-thread closures (group illustrates assorted sizes with trade-mark designs).
2. 63-mm. plastic continuous-thread closure, plain, round (inverted to show waxed vinylite liner).
3. 48-mm. plastic continuous-closure, stock design (Lustrseal).
4. Plastic continuous-thread closures (stock designs in many colors and sizes).
5. 70-mm. plastic continuous-thread closure, plain, round (inverted to show pulp and vinylite liner).
6. Plastic closure with dispensing spout and miniature closure for sealing spout (used on lighter fluids).
7. Plastic continuous-thread closures, stock design ("Tassel").



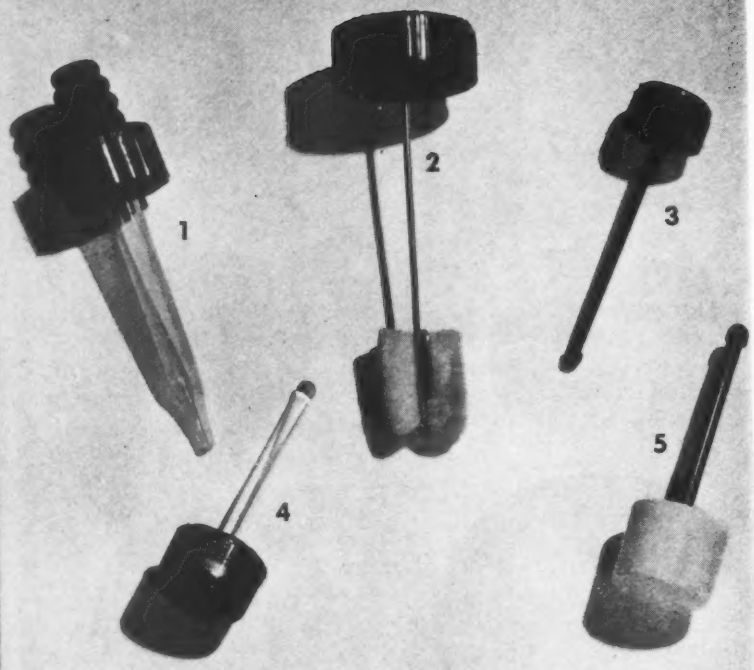
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Plastic Closures
Screw Type



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Plastic Closures
Applicator Type



1. Plastic continuous-thread closure fitted with glass dropper and rubber bulb.

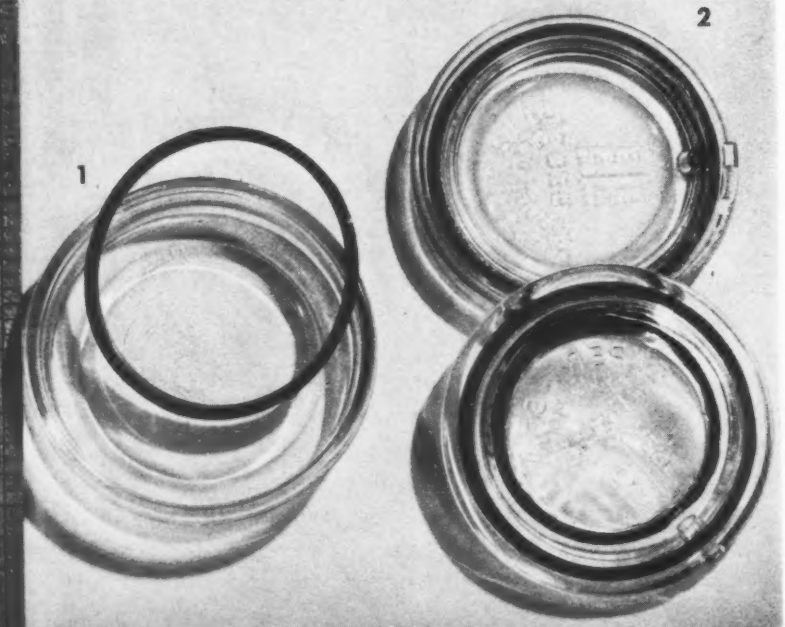
2. 28-mm. plastic continuous-thread closure fitted with wire edge and wool dauber.

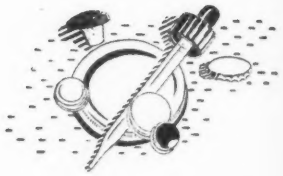
3. Plastic continuous-thread closure fitted with plastic applicator.

4. Plastic continuous-thread closure fitted with glass applicator.

5. Plastic continuous-thread closure fitted with plastic applicator.

Glass Closures



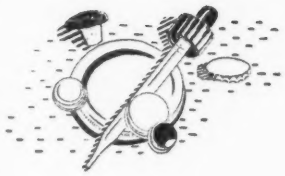


1. Glass closure, pry-off type, showing cut rubber or composition sealing gasket.

2. Glass closure, vacuum type. Slot at edge permits piercing cut rubber or composition sealing gasket to break vacuum.

(*Page* 222)

XUM



1: Paper continuous-thread closures, group of three-piece all paper construction.

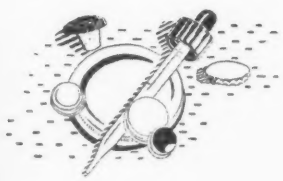
2. Closure of sulphite manila fiber; liner treated with amorphous wax or vinylite; applied to jar by pressure mandrel.

3. Double-shell, continuous-thread screw closure made entirely of paper and paperboard.

4. Paper vacuum closure for coffee jars. Liner treated with amorphous wax.

5. Three-piece closure ("Ring-Seal") for coffee jars, liner treated with wax.

6. Paper-lug closures for half-pound and pound tobacco jars (note sponge holder attached to inside of liner).

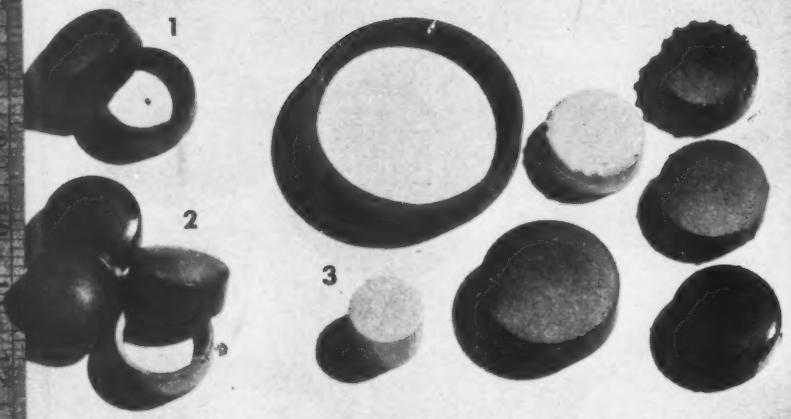


(*Page* 223)



XUM

Wood & Ceramic Closures



1–2. Wood continuous-thread closures.

3. Ceramic continuous-thread closures, available in many colors. Threads treated to avoid gritty abrasion on container.

Secondary Closures



1–2. Containers for medicinal products with secondary closures supplementing rubber caps to insure gas tightness.

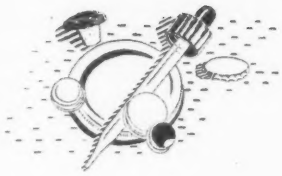
3. Liquor bottle with secondary closure ("Cel-O-Seal").

4. Secondary closure for liquid-food containers ("Sylph-seal").

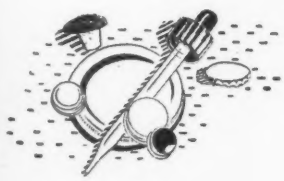
5. Coffee jar with paper and secondary closures ("Cel-O-Seal").

(*Page 224*)

XUM



1. Lever-lock closure with composition-cork liner.
2. Band closure with flowed-in sealing compound in disc.
3. Wood continuous-thread closure with pulp and vinylite liner.
4. Metal continuous-thread closure with slip-type rubber or composition sealing gasket.
5. Metal continuous-thread closure with safety-seal liner (safety-seal paper liner is adhered to container finish to indicate contents have not been tampered with).
6. Plastic continuous-thread closure with pulp and vinylite liner.
7. Plastic continuous-thread closure with metal-foil liner.
8. Metal continuous-thread closure with pulp and vinylite liner.



(*Page* 225)



Pottery containers

One of the most attractive members of the container family, the pottery package is still often considered primarily for luxury items. In relatively few cases have the excellent utilitarian properties of pottery packages been emphasized. Recently, however, new wartime applications of pottery have furnished some good examples which may tend in the near future to take pottery out of the luxury class and increase its use in American industry.

First let us look at the utilitarian role. Consideration should be given to the huge pottery jars in which chemical plants are now packing such commercial items as mercury, iodine, bismuth subiodide and the like. Here the jumbo-size jugs carry a burden dropped by war-requisitioned metal containers. Both for shipping and local storage, the stone crocks have been found to be doing a good job.

Another large user, a war baby as it were, is the U. S. Navy which has ordered vast quantities of bean pots—probably not so much for transportation from central galleys as for serving pots. Otherwise, pottery ware has not been widely adopted as an aid to the all-out war effort.

One of the principal reasons is the difficulty of obtaining a satisfactory closure for the clay container that will not involve the use of critical materials. The most satisfactory closure is one which requires a metal clamp and a ring of rubber for perfect sealing. Neither material, obviously, can be used extensively, if at all, for the usual civilian requirements.

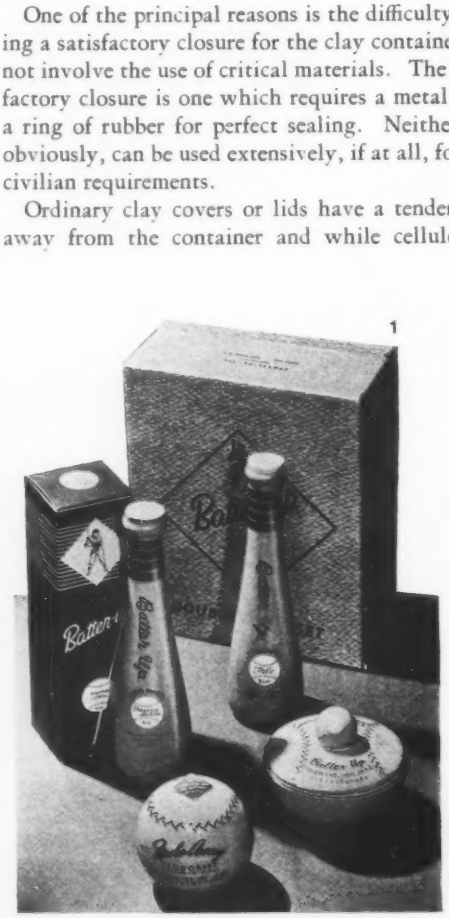
Ordinary clay covers or lids have a tendency to ride away from the container and while cellulose sealing rings may serve to take the container from the packer's factory to the consumer's kitchen, the problem of preserving partially emptied containers is one that has not been satisfactorily solved.

Chief uses of pottery

Use of the container made of the crust of Mother Earth, therefore, continues along the customary lines—for cheeses, for decorative purposes to carry perfumes and for some liquors where natural cork is still available for closure, or where the after-opening seal is not too important.

Probably one of man's first steps in the direction of civilization was the development of his skill in the use and design of clay containers. Historians today place a great deal of faith in their ability to trace long-forgotten peoples by the clay pottery remnants they have left behind. With the growth of skill and discovery of new compounds, better types and grades of pottery came into being—but there is still a strong family resemblance between the beautiful symmetrical demijohn filled with scented bath salts and the crude, sun-baked vessel from which the neo-something warrior drank his goat's milk. Some of this family resemblance is studied and deliberate, to be sure; all of it is artistic, and pottery, as always, remains an attractive means of packaging food and beverage and toiletry.

This consideration, plus the "premium value" of a pottery container for re-use, has kept it in the top ranks of the luxury items. Pottery containers have been a "natural" for gift packages—for here the contents







1. Packages for this related line of men's toiletries are made to simulate balls and bats. Photo Robinson Clay Product Co. 2. Gay perfume container sports a ship motif. Photo Shulton, Inc. 3. Pottery shaving mug is the re-use package for shaving tablets. Photo J. B. Williams Co.



4



5

War has opened new industrial vistas for pottery containers, but they remain favorites for cosmetics. 4. Ceramics package Old Spice men's toiletries. Photo Shulton, Inc. 5. A pottery container for women's make-up. Photo Vanderlaan Tile Co.

are often less important than the container, and the ultimate traffic will bear the additional cost of shipping and production, and the breakage mortality. The quaint-appearing earthenware jar is an acceptable gift whether it be presented empty or filled with cheese, liquor or perfumes.

Pottery in wartime

From the practical standpoint, earthenware has been commercially used for many years to package condiments, spices, bulk butter and cottage cheese. Most of us remember the vinegar and wine jug (and the brown jug Uncle George took with him at haying time), and to some extent these uses are coming back. But other considerations are not as yet such that the future looks too good for pottery to take up much of the tin can's former burden. Coloring of the pottery product has become increasingly difficult since the war's opening guns. Blues and reds are particularly difficult to obtain, though greens, brown, ivory and whites are still available. Black is completely out because of the fact that the essential ingredients are high on the priorities lists.

Wide use of clay products for many non-container uses—such as dipping baskets for plating of metals, as dishes for steam-tables and the like—is another factor which serves to keep makers from giving too much attention to civilian packaging needs; deliveries at best are far behind schedule if at all considered.

Strictly speaking, "pottery" springs from the French *poterie* and includes all objects made of clay. Earthenware and stoneware are interchangeably used for various processed forms of pottery, while porcelain is, properly, applied only to certain definitely designed varieties of pottery which are obtained in a special way. Porcelain, rightly, covers only products having a translucent quality. Porcelain originated in China and came thence to Europe where alchemists tried to duplicate the effect but failed because they tried to mix glass with clay. The Greek word *keramos*, meaning potter's clay, gave us the word "ceramics" generic term for the entire field.

Color in pottery depends upon the locality from which the clay is obtained, the composition of the body, and the method of firing. The amount of iron, for instance, is important in giving color to the product. Because good clays are found in most parts of the United States, home-made pottery is as good as any made anywhere. Lacquers and varnishes add to the possibilities of decorative treatment as well as the firing conditions. While the Chinese used cobalt to give color to their clay products—being one substance they knew that could stand the high temperatures—modern chemistry found others; but these will be temporarily out of use for the duration of the war.

High-temperature firing is vital if pottery is to have the vitreous protection required by certain contents and that is a point that must be considered when selecting pottery containers—absolutely moistureproofed containers must be had only in limited colors, for certain hues will not stand the high temperatures that their more drab cousins take with greatest of ease. Unglazed pottery is highly porous and has a tendency to sweat—which is a reason that they are often preferred for cheese products; cheeses age better in pottery. It must be remembered that additional colors in a pottery container mean additional firing and thus increase final cost of the pottery package.

Self-material lids, cork, wood amd plastics are generally used for closures, and in nearly every case they require an additional device such as a clamp, an adhesive strip, sealing wax or similar material to keep them in place. While attractive, many of these are not permanent so that the artistic appeal of the pottery container remains the chief characteristic that gives it the preference over others. It is this quality of eye appeal, however, which does such a good sales job that extra cost can be discounted.

Packaging problems can, however, be safely placed in the hands of most of the pottery makers with assurance that they will come up with an adequate suggestion and a practical design for marketing.

Merchandising the glass package

by J. H. Gilluley

The glass container is primarily a sales container, and no detail which will take the fullest advantage of its sales appeal should be overlooked by the packager.

A substantial class of glass containers depends for its merchandising pulling power on the moldable characteristic of glass. It is a characteristic which has decisive advantages for the packaging of certain products, even though its full employment may put the container into the classification of "special molds," thereby adding to its cost. In this classification fall the dispensing bottles, the process bottles and others specially designed for the use of the product.

The dispensing bottle is usually designed for an applicator cap, the most familiar types being liquid shoe polish, iodine and drawing-ink bottles. Process bottles are those designed to facilitate a unique process required by the product; chemicals, for instance, which must be applied in a certain order, are put into plainly labeled glass containers and packaged conveniently together. A typical example is the package of liquid ink eradicator which everyone has used; in this and in similar cases, the type of package has virtually made the product possible.

Other bottles and jars are specially shaped for convenience in use. Ink bottles, for example, are designed to make the last drop of ink available or to simplify the filling of fountain pens. The rock-and-rye bottle is another which is designed for a particular purpose peculiar to the product.

Glass design, as an aid in merchandising, has for these products been made functional. The shape of the container is an integral part of the merchandising plan. Glass, being an adaptable material, has thus been given a secondary function scarcely less important than its primary function of packaging. The moldability of glass is a characteristic which can in many cases be made to solve a rather perplexing problem in merchandising.

On the other hand, a reliance upon special-glass container molds for merchandising a product is frequently misplaced. The theory is that a package of unusual shape may become so identified with a specific item that it has positive advertising value. There is something to be said for this view. The hexagonal green glass container of a few years ago was identified with prune juice. There is some pre-exhilaration in the shape of the whiskey flask, and consumers would feel that one of nature's unwritten laws were violated if it contained, say, vinegar. But the individual brand names which are identified with particular bottle shapes are few and far between and supported by vast advertising; Heinz ketchup bottles, Hellman's mayonnaise jars and Gulden's mustard jars are the few that are called to mind.

Standardized glass

Too often individuality results in glass container shapes that are merely odd and often freakish. They are of doubtful aid in merchandising. Outside the perfume and liqueur industries which operate on a logic which passeth ordinary understanding, there is no reason for a glass container to assume the shape of hour-glasses or crowns or other figments of the designer's fancy.

If the packer examines his costs closely, he will doubtless find that the slower speeds of unusual or freak glass containers on his filling lines are not compensated for by increased sales. *Almost invariably, the bottle or jar of the simplest design is the one best suited mechanically for high-speed production lines.*

These are almost always the standardized glass containers, obtainable from most of the glass manufacturers. These have been evolved through the common experience of many companies, and embody the best design principles

1. Within the range of standardized container shapes and sizes, the manufacturer may attain distinctive packages and individual effects by means of his labels. These may vary in shape, in size, design, color or in position on the container.





2. The dispensing bottle has often made the product possible. Examples of this merchandising function of the glass container are the drawing-ink bottle and bottles for ink eradicator and shoe polish, each equipped with its special applicator.

from the point of view of both the manufacturer and the packer. In the postwar period, it is probable that these standardized designs will predominate in the glass packaging field.

The wartime experience of packers with the standardized containers required by WPB has been broad enough and extensive enough to clear up one or two misconceptions about standard designs. For instance it has been found that the standards now available offer a considerable range of possibilities. The packer has a choice, not unlimited but certainly reasonable, among a considerable variety of designs, capacities and types of finish. Moreover the packer has learned that there are a good many ways to individualize his standard container. The classic example of what may be done by ingenious package treatment is the beer bottle. No one confuses a Pabst and a Schlitz package, although the bottles are from the same molds.

Given a standard glass container, the packer has three elements to work with to make his glass package more attractive or more salable. In the first place, he has the shipping carton, which itself may, in some instances, be made a sales-making ally. The Del Monte campaign, for instance, included instructions to the grocer on how to make use of the shipping carton in floor displays of the self-help type. Other packers, developing the same idea along different lines, have devised other ways to make the shipping carton serve a double purpose as a merchandising unit. In normal times when paper is less scarce, more may be done, especially in glass-packed food lines, to utilize the shipping carton much more extensively for display purposes.

In the second place, the glass packager has a considerable field in which to exercise originality in choice and treatment of the closure. The type and nature of the product dictate, to some degree, the type and nature of the closure. Beyond these requirements, the merchandiser is free to develop the closure so that it will be an attractive part of the completed package. An arresting contrast in color, the utilization of the closure top for an advertising message, the treatment of the closure to add to the convenience of the consumer—the possibilities here for diversified and sales-building effects are manifold. A conference with your closure supplier will shed new light on the opportunities in this direction—opportunities which will in all probability be greatly extended after the war.

In the third place, labeling which is not only correct but distinctive is a sure means of making your standard glass container a sales-getter. A glass package with an attractive product is already half-labeled; the problem is to complete the job in as satisfactory a manner as it has been started.

After all of the completely mechanical requirements have been satisfied, color, shape and design of the label may with judicious care be made to assist the product to sell itself. If a particularly dressy package is desired, secondary or neck labels may be added, a decorative feature fully exploited in the liquor field.

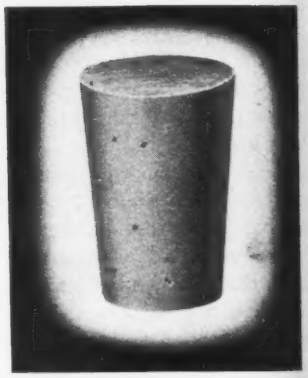
In general, the most successful glass package is the one which avoids useless distortions of shape and needless employment of glass. Except in cases where a functional reason can be found for adopting special designs, the ends of merchandising are best served by adhering to the simple, tested standard shapes and making them distinctive as possible.

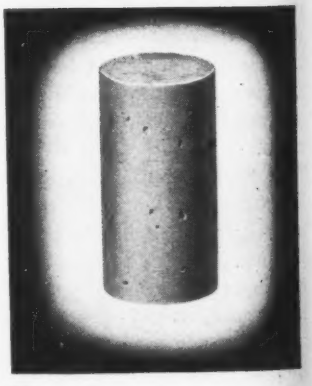
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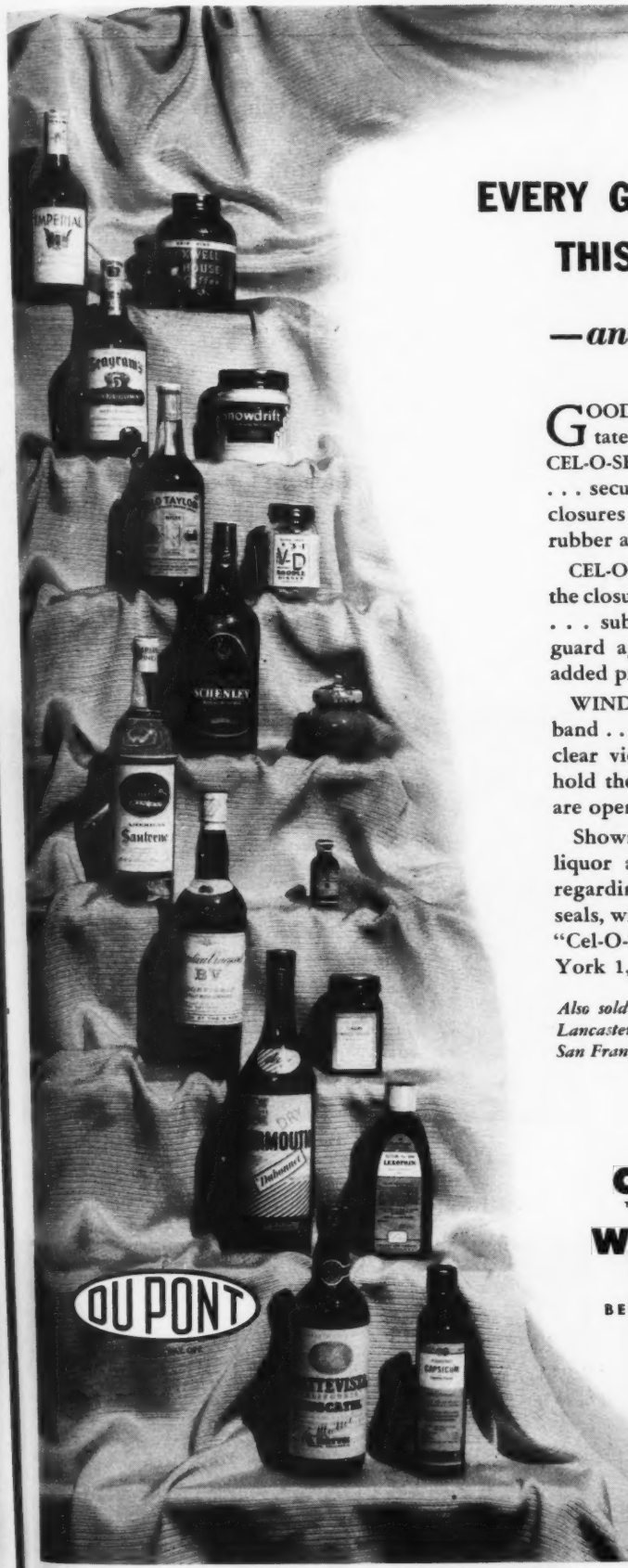
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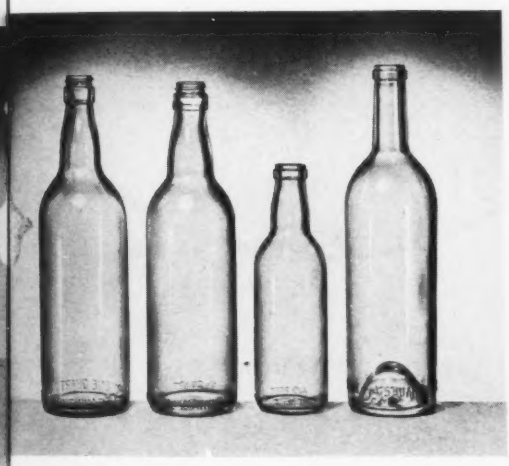
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A Wide Range of Closures

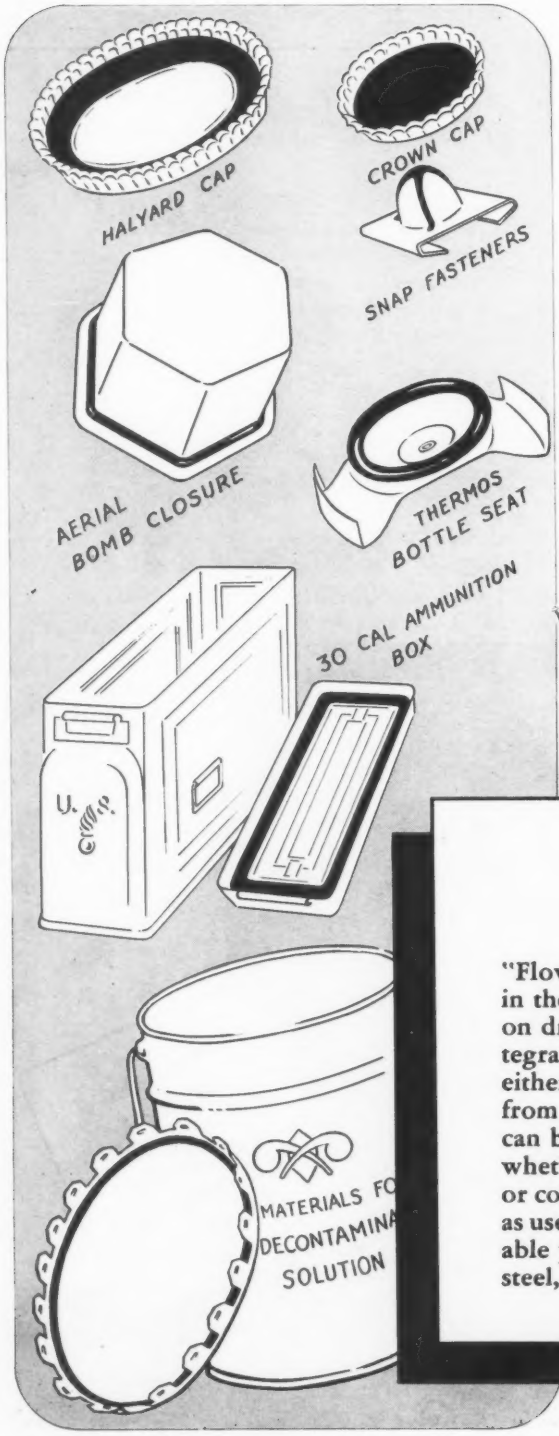
You'll find the right closure, too, in the Armstrong Line, to dress up your package, seal its contents safely and economically. Currently available are eye-catching lithographed Armstrong's Metal Caps; a complete line of straight, tapered, and shell corks; and decorative, protective, "Cel-O-Seal" Bands. Available in limited quantities are Embossed-Top Corks, Artmold (plastic) Caps, and Crowns.

For complete details about any Armstrong glass container or closure, get in touch with your Armstrong representative, or write the Armstrong Cork Company, Glass and Closure Division, 6812 Arch Street, Lancaster, Pennsylvania. Factories at Millville, N. J., and Dunkirk, Indiana.



Glass and Closure Division, LANCASTER, PA.

For Your Post-War Products



★

Out of today's wartime experiences with many new types of packages come post-war opportunities for new containers. For example, the knowledge acquired in learning how to extend available supplies of natural rubber and to replace it with synthetics has opened new fields of usefulness for "flowed-in" sealing compounds. Perhaps, for example, the experience gained in making puffed gaskets for the rectangular 30-caliber ammunition box holds the answer to one of your present problems.

Even though war jobs naturally have first call on our efforts, we welcome the chance to talk over your ideas and plans for improving tomorrow's packages.

DEWEY AND ALMY CHEMICAL CO.
CAMBRIDGE CHICAGO OAKLAND

Salient Facts about "Flowed-In" Gaskets

"Flowed-in" gaskets are tailored gaskets made directly in the sealing groove from a liquid compound that, on drying, gives a gasketing material which is an integral and permanent part of the closure. It is applied either in semi- or fully automatic machines at rates from 40 to 500 per minute. The type of compound can be varied to fit the nature of the product packed, whether water or oil-base, vacuum packed, or for hot or cold packs. The films vary from thin, tough films, as used in double-seamed containers, to thick, deformable yet resilient gaskets that seal metal lids to glass, steel, plastic, or fiber containers.

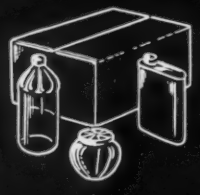
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A COMPLETE PACKAGING SERVICE... *Glass · Metal · Plastic · Shipping Cartons*

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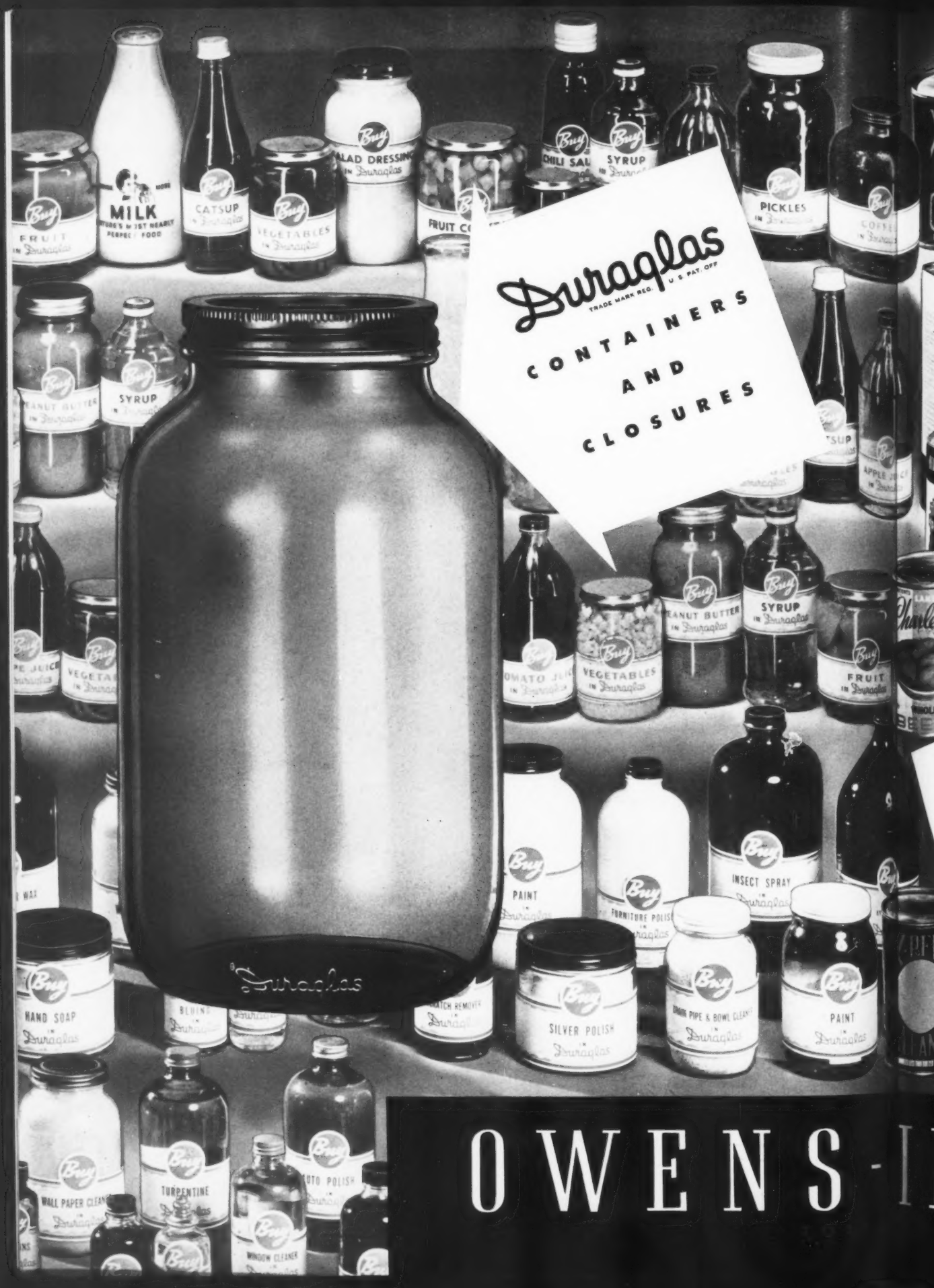
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PICKLES
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FRUIT
PAINT
INSECT SPRAY
HAND SOAP
SILVER POLISH
TURPENTINE
WINDOW CLEANER
OWENS-I

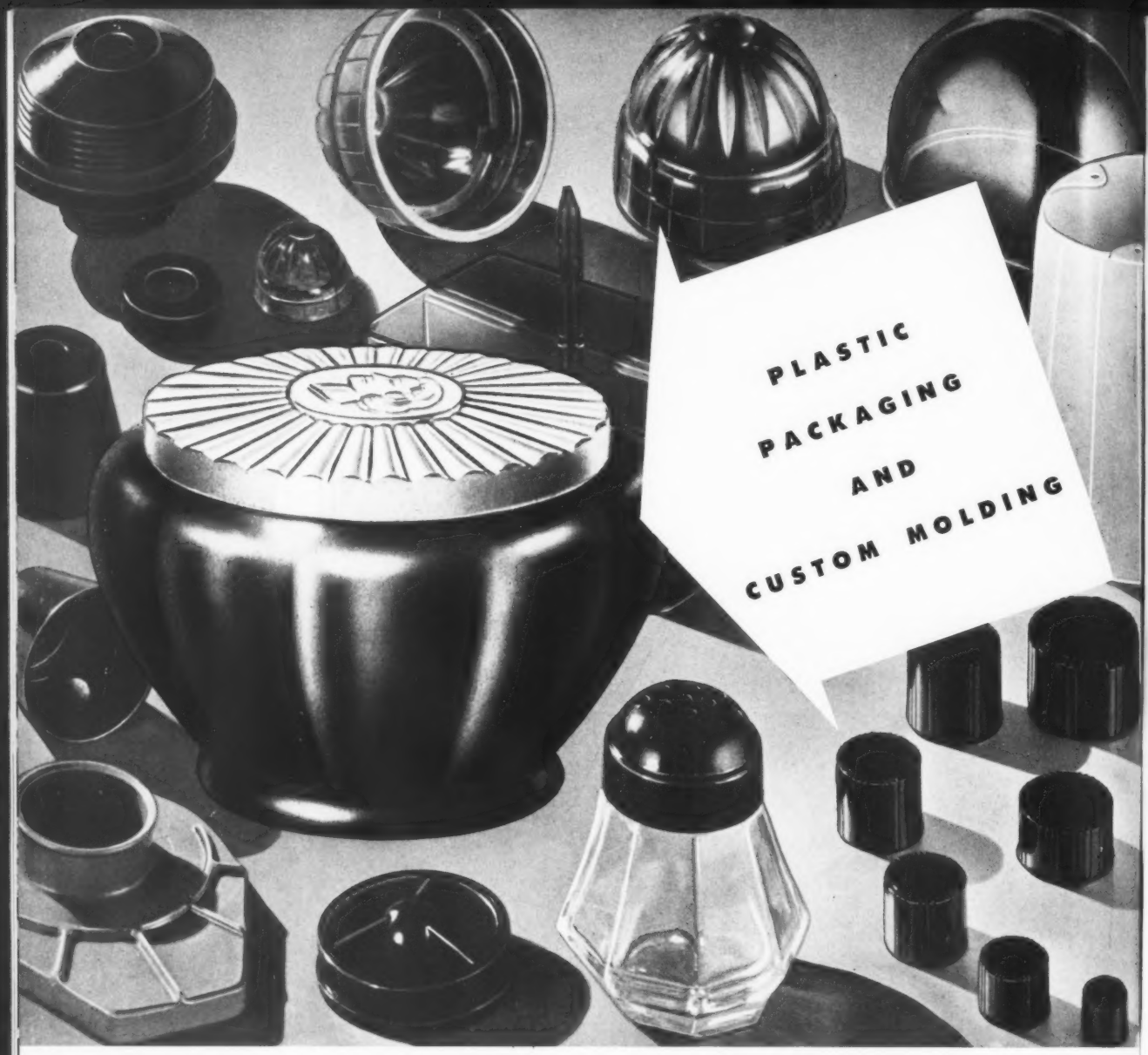
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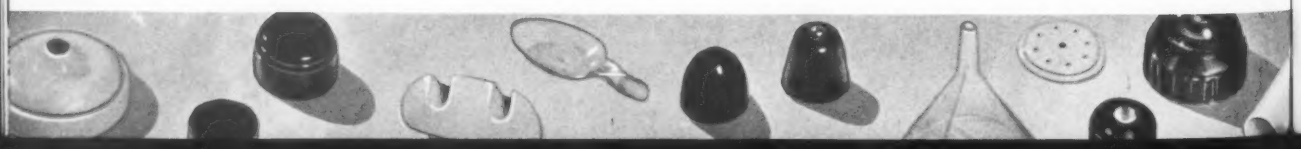
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Owens-Illinois facilities are being devoted to packages that transport foods, medicines and other vital war necessities. Meanwhile, our packaging research laboratories are planning ahead for tomorrow. We will welcome the opportunity of fitting our post-war packaging ideas to your product.

OWENS-ILLINOIS

TOLEDO, OHIO



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NO ONE KNOWS when the conversation can become general about those new products that are now in the "whispering" stage.

But long before that happens, something must be done about the package. So, we'd like to say a word in behalf of glass, Brockway Glass especially.

There's no question about the superiority of glass containers when it comes to looks and product appeal . . . there's no denying the added sales impulse that glass gives, by showing your customer the goodness and attractiveness of your product.

This is especially true of Brockway Glass. It's clear. It's well made by men who know how. It's lightweight for its strength . . . and it will pack and carry safely. It will display and protect your products.

So, when you get ready to talk about modern packaging, you'll find helpful our 37 years of glass container experience. We'll welcome your call.



BROCKWAY

SPECIALISTS IN GLASS CONTAINERS

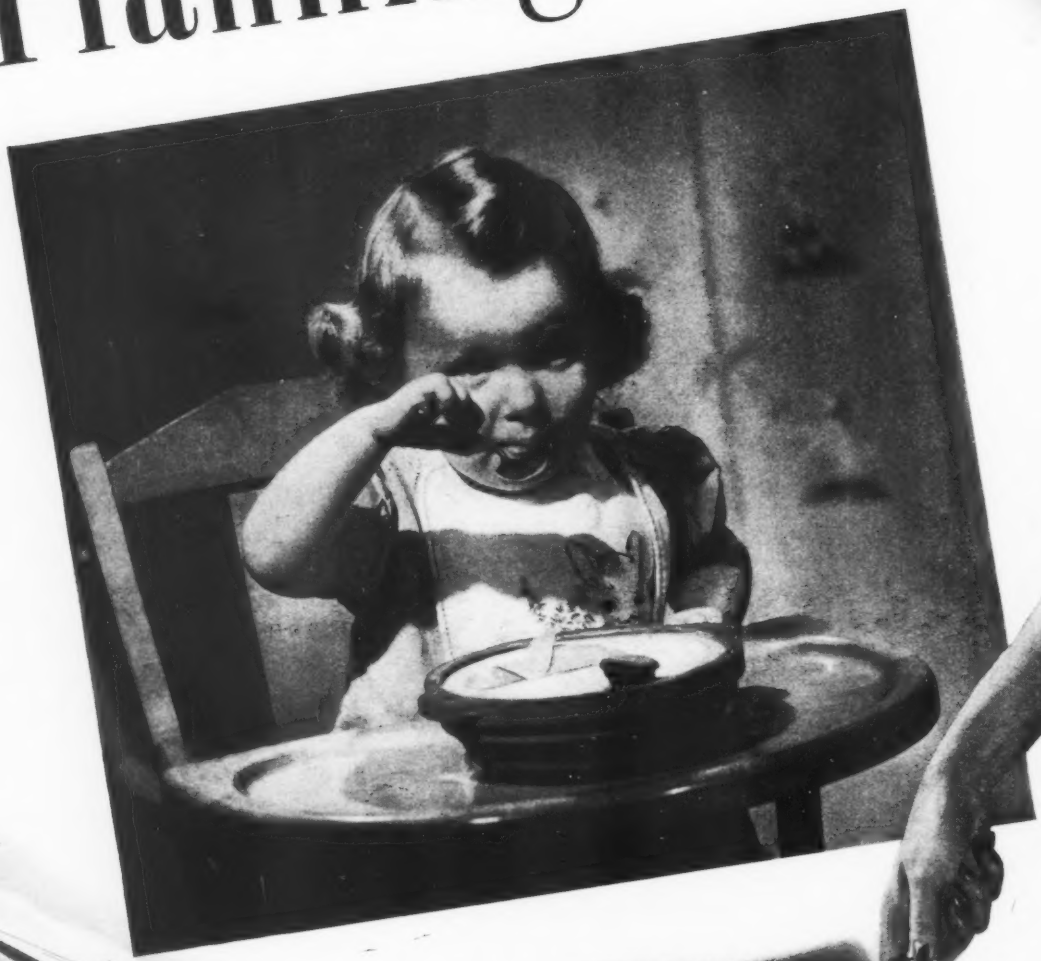
GLASS COMPANY

INCORPORATED

Brockway Pa.

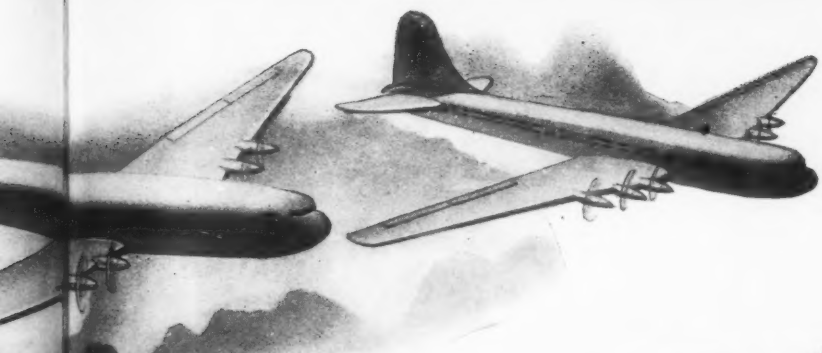
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Post-War Planning...



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Post-war plans are heartening. New designs—new efficiency in planes, in cars, in household appliances, in all the machinery of modern living—are an accepted fact.

Immediate after-the-war plans at Hazel-Atlas call for continued mass production of economical lightweight glass containers. This will insure the distribution of essential foods and aid in solving one of the most important post-war problems.





HAZEL-ATLAS GLASS CO.

Wheeling, West Virginia

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End Leakage, Evaporation Moisture Ingress Air Seepage TAMPERING and CONTAMINATION with Filma-Seal*

Typical Products Filma-Seal Protects!

	LEAKAGE	EVAPORATION	MOISTURE INGRESS	AIR SEEPAGE	TAMPERING
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Chloroform & Ether	X	X	X	X	X
Cider & Vinegar	X	X	X		X
Cleaning Fluid					X
Cocoa	X				X
Cod Liver Oil	X	X			X
Corn Remedy					X
Cosmetic Creams					X
Dehydrated Foods					X
Dietary Foods	X	X			X
Dyes					X
Edible Oils					X
Effervescent Salts					X
Elixirs		X	X		X
Flavoring Extracts		X	X		X
Fluid Extracts					X
Food Colors		X	X		X
Fruit Juices		X	X		X
Hair Oil					X
Hair Wave Preparations					X
Hard Candy					X
Hygroscopic Capsules, Tablets					X
Inhalants					X
Lighter Fluid					X
Liniments					X
Malt Extracts		X	X		X
Maple Syrup (Pure, Blended)					X
Methyl Salicylate					X
Milk Powders					X
Mineral Oil					X
Motor Oil					X
Ointments					X
Paints					X
Peanut Butter					X
Perfumes, Toilet Water					X
Proprietary Preparations					X
Sauces					X
Shoe Polishes					X
Shortenings					X
Spices, Seasoning Salts					X
Spirits of Nitre & Ammonia					X
Sun Tan Oil					X
Suppositories					X
Vitamin Products					X
Volatile Organic Solvents					X
Wines					X

(SEND SAMPLE OF YOUR PRODUCT FOR FILMA-SEAL RECOMMENDATION)

Closures by Gutmann



During 53 years of making closures we've met and solved many closure problems. We make standard closures — we make specialties. Leader among these specialties is Filma-Seal.* This patented closure method has been shelf-tested and time-tested by leading drug, food, cosmetic and sundry manufacturers packaging in glass. Filma-Seal* comes as an integral part of the Gutmann Screw Cap and is applied in one operation with the cap. It is suitable for high speed automatic or hand bottling operations. Filma-Seal* provides a tight, edge-to-edge inner seal which stays on the lip of the bottle when the screw cap is removed.

Standard Filma-Seal* closures are available for many products. Consult with us if you have a *special* problem. Our laboratories, and the closure research technicians who man them, have helped solve closure problems for many manufacturers. They may be able to help you too. Write today for further information or send a sample of your product for recommendations.

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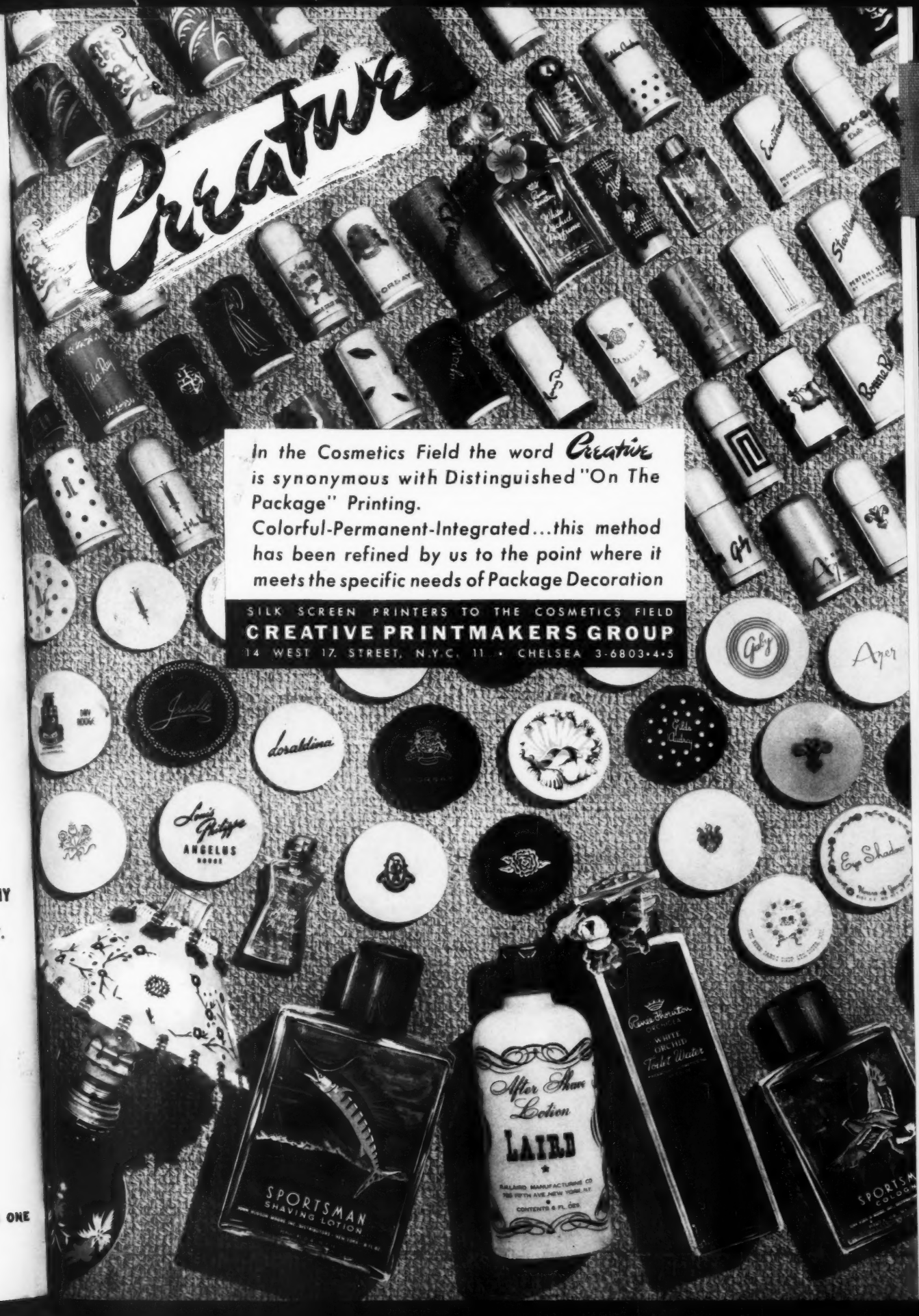
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CAP AND SEAL APPLIED AS ONE

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After Shave
Lotion
LAIRD
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Toilet Water
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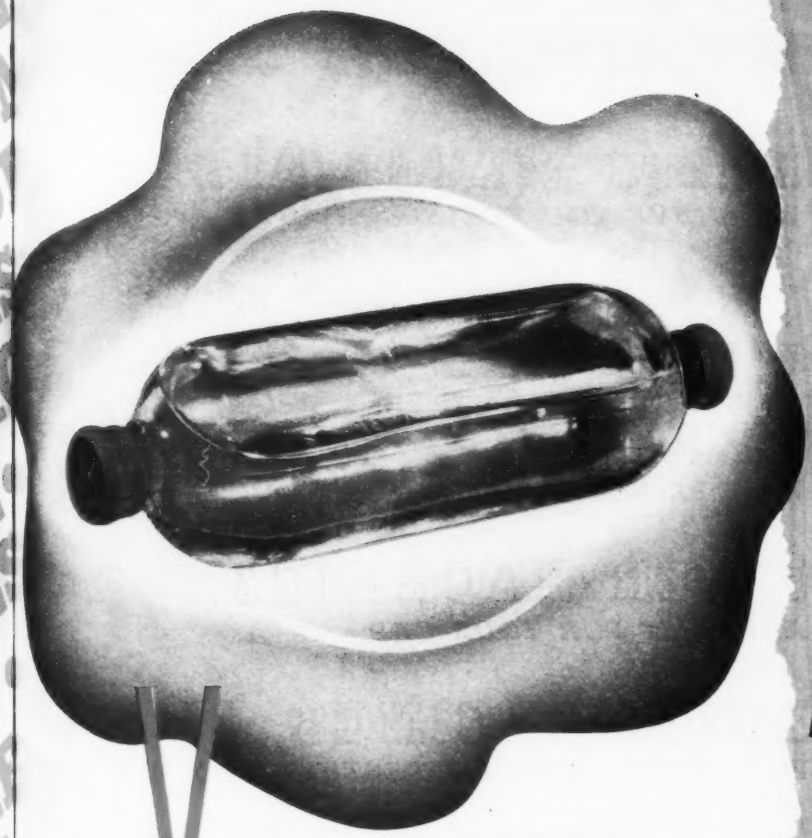
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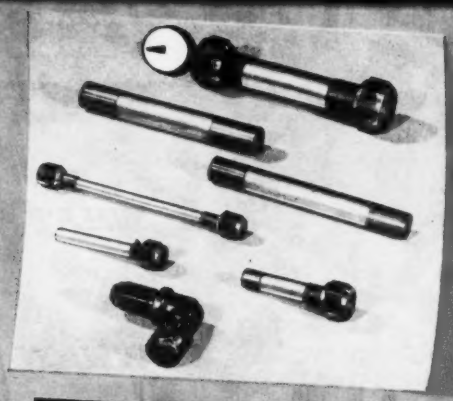


VICTORY-VITAL

AND "HOME FRONT" USES

CELON Safety Seals are serving efficiently in a never-ending variety of important wartime applications. Vital to victory is the positive protection . . the high degree of sanitation they give to blood banks, serums, and a long line of essential drugs and chemicals. Aircraft parts reach their far-flung destinations dirt-free, ready for quick, clean installations, when covered with these tight and tidy seals.

And, on the "home front" the colorful beauty of CELONS helped McGarvey's Flame Room Coffee win a blue ribbon award in Spice Mill's packaging competition. Replacing drab, wartime metals, CELONS bring new sales appeal, new sealing efficiency to coffee, wines, whiskies, shortening, peanuts, and a host of widely known foods and drugs. Perhaps YOUR products also may be better sealed with CELONS. They can be decorated, or plain. Send us a sample container. We'll return it quickly, safety-sealed with a CELON for your consideration.











THE CELON COMPANY

Main Plant and General Offices, Madison, Wisconsin

Branch Offices or Representatives in 25 Principal Cities

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NO. 2 WHAT **CAP CONSTRUCTION**
WILL SUIT YOUR PACKAGE BEST

NO. 3 WHAT **CAP STYLE**
WILL BE BEST FOR YOUR PRODUCT

NO. 4 WHAT **LINER BACKINGS**
ARE BEST FOR YOUR CAP

NO. 5 WHAT **LINER FACINGS**
WILL MEAN BEST PROTECTION IN YOUR CAP

NO. 6 WHAT **SPECIAL LINERS**
CAN YOU USE TO ADVANTAGE IN YOUR CAP

NO. 7 WHAT **PROTECTIVE FILM**
WILL YOU NEED INSIDE YOUR CAP

NO. 8 WHAT **SURFACE TREATMENT**
WILL BEST PROTECT YOUR CAP

NO. 9 WHAT **LITHOGRAPHY**
WILL MAKE YOUR CAP A SELLING TOOL



★ ARIDOR urges you to ask us the answer to these Key Questions. Our Specialized knowledge of correct cap requirements is at your disposal. No obligation, of course.

the ARIDOR Co.
3428-40 WEST 48TH PLACE — CHICAGO

WILL PRE-WAR PACKAGES GET POST-WAR SALES?



CANS AND TUBES

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Progress & research in can manufacture

by F. J. O'Brien

Any businessman who faces the future realistically need have no worry about prospects for metal containers. To be sure, except for essential foods and other high priority products, the familiar tin can has been on a long leave of absence. For many products, that leave of absence will be continued for some time at least. That does not mean that the can-making factories have been shut down—far from it. The production of metal containers for canned foods has been greater than under normal conditions. This can be verified by reference to the statistics of the National Canners Association which show increased case production in metal of processed fruits and vegetables in practically all lines.

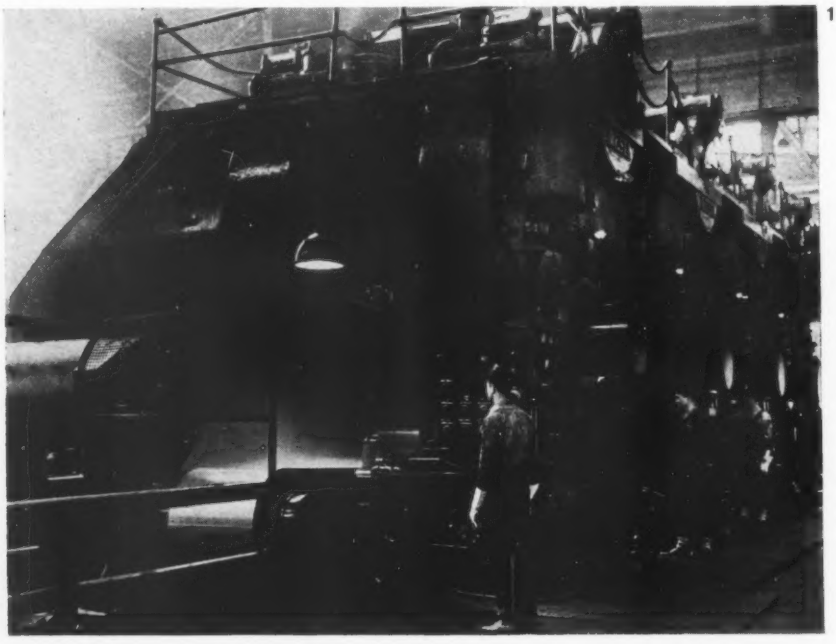
Despite these increases, the civilian share of canned foods must for the time being be decreased. Of the 1944 pack, the War Food Administration has ordered increased "set asides" for Government reservation amounting to 42.3 per cent of canned vegetables and 72 per cent of the 14 principal canned fruits. This obviously means a reduction in the civilian share, but no civilian will complain because his portion is cut down when he knows that this means less than three-quraters of a can of fruits and vegetables each day for each fighting man, and when he remembers that the soldier's principal reliance for food is upon the canned product. Nor will civilians complain because cosmetics, paints and other products are temporarily denied the use of tin so as to increase the supply of metal containers for military use.

The crop prospects for the current year, on the basis of estimated averages, should provide a total of possibly 250,000,000 cases of canned fruits and vegetables. For these products the can manufacturers must provide containers, whether for use by the armed forces or for civilian consumption. In addition to this volume of production, the can makers—like all other industries in our free economy—have taken on many new responsibilities for direct war needs. They are making cans that save lives—like the blood plasma container, or the "provision bomb" designed to be dropped to survivors at sea. They are making cans to contain ammunition and gas masks; they are providing containers for fuels and lubricants for planes and tanks.

Can manufacturers took on their full share of war work without any interference with their normal facilities for producing cans. They simply extended their activities and made use of warehouse space not currently needed for normal storage, in order to accommodate war production. Their conversion to war work was easy, quick and painless.

By the same token, reconversion will pose no great problems. Within a very short time, relatively speaking, the can factories can be turning out metal containers as before, with only one obstacle. Manpower will be the principal hurdle; but assuming that the can makers will get their share of men when demobilizing begins, this difficulty should not be too great.

It must be remembered, however, that the can maker is a fabricator. One of his raw materials is the steel mill's finished product. The steel mills, too, must return to normal activity and be in a position to supply the requisite black plate. Subject to those two provisos, it is safe to predict a quick reconversion.



1

1. This machine for the making of tin plate reduces the thickness of the hot rolled strip preparatory to the flattening, tempering and surface conditioning essential to the manufacture of high-grade tin plate. Strip travels at rate of 1800 ft. per minute. Photo U. S. Steel Corp.

The question has been asked whether former users of metal containers, now denied them, will abandon substitutes and resume the use of tin cans. As everybody in the packaging field knows, products like coffee, shortening, paints, lubricating oils and cosmetics have been using substitute packages because of the imperative need for conserving metals. Judging, however, by the number of producers in those fields who are constantly asking the Can Manufacturers' Institute—and no doubt every individual can manufacturer too—when they can get metal containers, there is no basis whatever for any question about the future of the metal package. It would seem that the long leave of absence has merely served to arouse a keener desire for the familiar tin can.

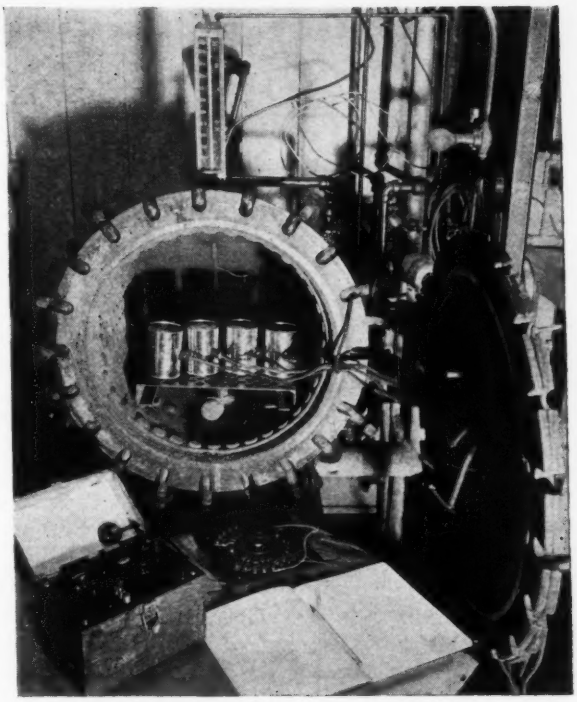
There will doubtless be a few products which for one reason or another may not come back to tin. On the basis of the economics of marketing and distribution, the vast bulk of processed foods will continue to appear in the form of package which offers great convenience and service value at lowest cost.

This question naturally arises: "What about the supply of metals?" As far as tin is concerned, the fact may as well be faced—conservation is going to be necessary for some time to come. Normally the consumption of tin in the past has amounted to perhaps between 125,000 and 135,000 tons per year for all purposes. By using lighter coatings of tin and substituting other materials, the wartime consumption has been reduced to perhaps 75,000 or 70,000 tons per year for all purposes. Bolivian tin has been arriving in increasing quantities and other sources have been supplying some. One of these sources is the reclamation process, and in this direction the detinning companies have done an outstanding job of salvage.

The steel situation has already been somewhat relaxed. As this is written, production facilites in the steel field are still being pressed into service to provide steel for military purposes. Those uses of course, take top priority, but this is a peak load that may lighten in a comparatively short time. As the war demand decreases, the outlook for steel will be considerably improved for industrial purposes.

The can manufacturing industry, in spite of its extra responsibilities, has not allowed its research program to stand still. Rather, the needs of war have served to accelerate certain important developments. Many of these projects were well under way prior to the war. For instance, the can manufacturers have always worked very closely with the steel mills with respect to formulation of metals to produce certain results. Considerable progress has been made as to the ductility of the basic plate used for cans. At the same time, the can companies have spared no expense in coöperating with the steel companies in perfecting methods of electrolytic coating, the results of which have been a tremendous conservation of tin. Tin plate carrying these lighter coatings of tin will have a permanent place postwar. Its extent still has to be established. The same qualification might apply with equal weight to other substitute coatings. But when the full story of the research efforts of the

2



2. Can manufacture is accompanied by constant and careful testing of many types. The illustration shows filled cans ready to undergo the heat-penetration test. Note how the "thermocule leads" are brought through the retort door and attached to the cans. Photo American Can Co.

industry can be told, it will present a most impressive picture—one which includes development of new alloys, methods of soldering, experiments with sealing compounds, corrosion prevention and numerous other projects. The prospect should reassure producers of packaged products, for unquestionably the metal container will continue to serve the consuming public in many ways.

The war has given impetus to the trend toward standardization of metal container sizes. The can manufacturer views this trend almost from the standpoint of a bystander. We are in the business of making containers, and our equipment will produce whatever our customers demand. From the standpoint of conservation of materials and consumer convenience, standardization has certain advantages. Whether in normal times these advantages will offset the equally obvious advantages of package individuality, is a question which must be decided jointly by producer and consumer. A wholesome competitive economy can be counted on to make sure that the ultimate consumer will get all the benefits of mass production. The can manufacturer stands ready to produce the kind of packages needed.

When will these packages be available? That, of course, cannot be answered today. When X-day comes, and when the materials and facilities in this field are no longer needed for the war effort, we can convert, and convert quickly. Subject only to availability of materials and manpower, it will merely be a matter of short weeks before our production lines are delivering the cans.

Versatility of the metal can

by Gordon Cole

Known throughout the trade as a "tin can" whether it encases a food product, paint, tobacco, insecticide, face powder, typewriter ribbon or any one of a hundred other similar items purchased regularly by the American public, the metal container stands pre-eminent today as a highly efficient low-cost package.

Since 1820, when William Underwood in Boston and Thomas Kensett in New York started the first commercial production of canned foods in the United States, the use of tin cans as containers for foods and other products has steadily grown in volume and variety in this country. The extent of that growth is indicated by the fact that in the last 30 years the average annual U. S. per capita consumption of canned goods has increased from 17 to 130 cans. Previous to Pearl Harbor, the civilian populace was opening, discarding and replacing 45,000,000 tin cans daily—a total of approximately 17,000,000,000 cans a year.

These are astronomical figures, yet they tell only part of the story. In January, 1940, *Fortune* magazine remarked:

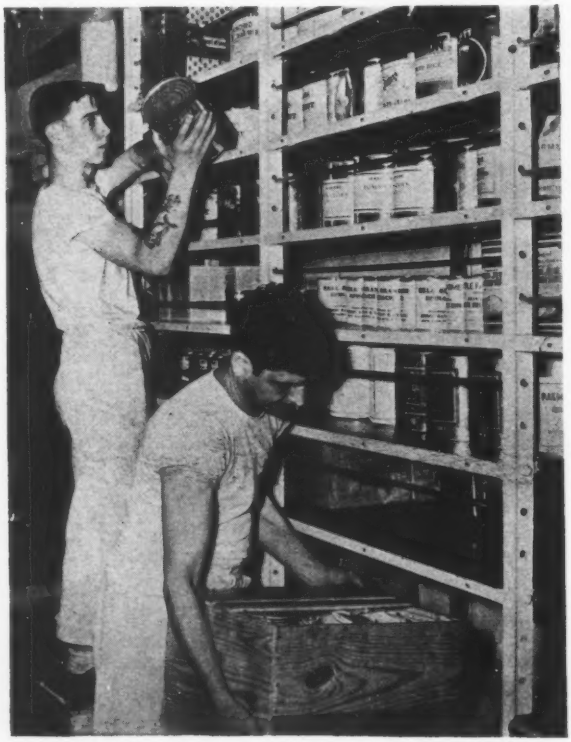
> The tin can is at least as pervasive an instrument, at least as sharp a characteristic of American life, as anything on wheels or wires. It establishes the working hours of housewives and affects the entire design of family life. Its effect on the national diet is incalculable. The U. S. public buys annually about 12,000,000,000 cans of food. It buys 4,000,000,000 more cans of merchandise from antifreeze to aspirin. It opens cans of all kinds at the rate of around 500 per family per year. Yet the machine-conscious American takes remarkably small interest, critical or otherwise, in the can. He has brushed it off to a place in his folklore somewhere between the vaudeville joke about the neglected husband and the classic cartoon of a goat on a dump heap.

Yes!—the average American has taken the "tin can" completely for granted. It has brought his favorite food to his table in season and out—it has helped cure his headaches via the aspirin tablet and has delivered the best grade of motor oil to his automobile, untampered with from the day it left the refinery to the moment it was poured into his automobile engine. But has he ever given the "tin can" the credit? There is much to be said for *Fortune's* contention that he hasn't.

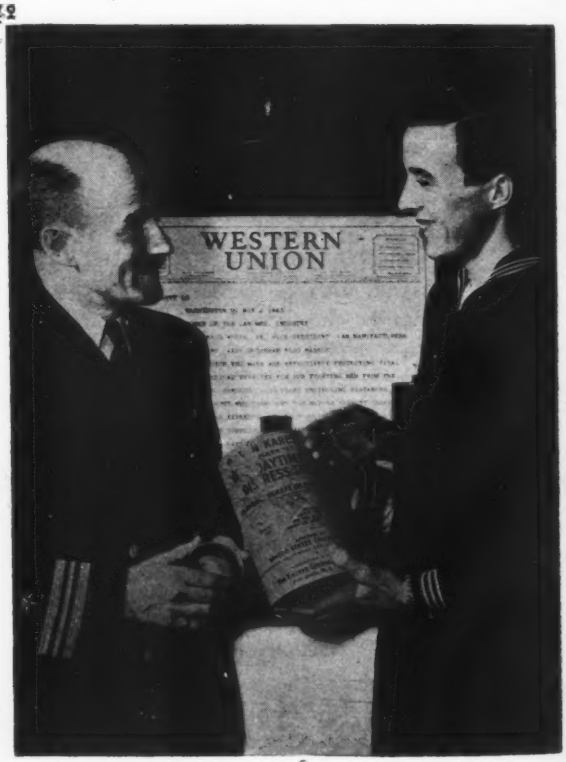
But the foregoing observation was made in 1940. When the present war is over the situation may be quite different. Total war is a highly exacting taskmaster. It demands the best of men, machines and materials. It commandeers from civilian life those men, machines and materials that can serve the war effort best. It says to the civilian populace: "We have taken all or most of

1. Navy men aboard man-of-war stock food shelves with familiar tin cans. 2. Coxwain William Street owes his life to the daytime distress signal flare in a tin can. After his ship was torpedoed in the Indian Ocean, he spent 15 hours in the water, was picked up, then drifted for 11 days in a lifeboat with others. Photos Can Manufacturers Institute.

1



2

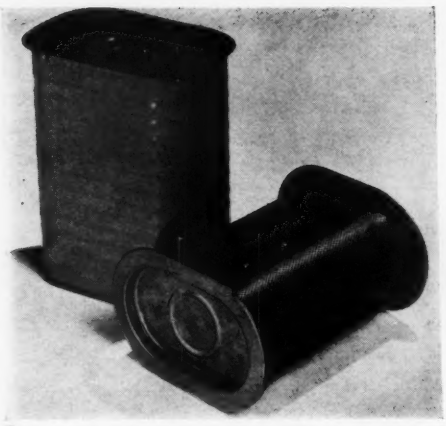




3



4



5

3. Beer cans, now rare at home, carry emergency drinking water in life rafts. 4. Sardine cans, carried in seat packs, hold concentrated foods for emergency use of flyers shot down over water. 5. Special wartime metal container used as part of soldier's gas mask to hold the chemicals that filter out poison gas fumes. Photos Can Manufacturers Institute.

this product because it is ideally suited to our purpose. The enemy will not wait until we have developed an acceptable substitute. You will have to get along without it until the war is over or until production can be increased so that after our needs are filled there is enough for you as well." This has happened to many products in this war, including "tin cans." Possibly no other circumstance could so effectively impress the virtues of a product upon a nation of people.

What are the virtues that have made the "tin can" such a highly satisfactory container in peacetime and so vitally essential a container for our Army, Navy, Marines and Coast Guard in war time? The accompanying list shows that they can be stated in simple words.

Convenience—Easy to store, easy to carry, easy to handle, easy to open, easy to heat, easy to ice, easy to dispose of.

Safety—It keeps in vitamins, minerals, flavor, color. It keeps out light, air, moisture, gas, dirt, germs.

Strength—It is hard to break, tamper-proof, nonporous.

Economy—It costs little to make, is inexpensive to label, to ship, to handle, to display.

For food, especially, it provides year-round variety, high nutritive values, peak of quality.

While these few simple words suggest a multitude of values, these values in turn point to one over-all conclusion: the outstanding characteristic of "tin cans" is their versatility—versatility of values and versatility of uses. Never has this fact been so dramatically demonstrated as by the variety of services tin cans are rendering our armed forces today. These services break down into three main classifications: tin cans as food containers, tin cans as miscellaneous containers, and special war services of tin cans. A condensed description of each classification follows.

The following is a quotation from a recent pamphlet prepared by the WPB: "Now that American troops are widely dispersed, practically every soldier and Marine on foreign shores will eat food packed and shipped in tin-coated steel containers—Tin Cans. Abroad almost all food arrives in tin and steel. Our military forces will soon be consuming 30,000 tons of food daily. Tin-coated steel containers—used to transfer food—withstand shock, heat, cold, contamination, climatic changes, storage hazards." It is estimated that two-thirds of all food our soldiers eat today comes out of tin cans.

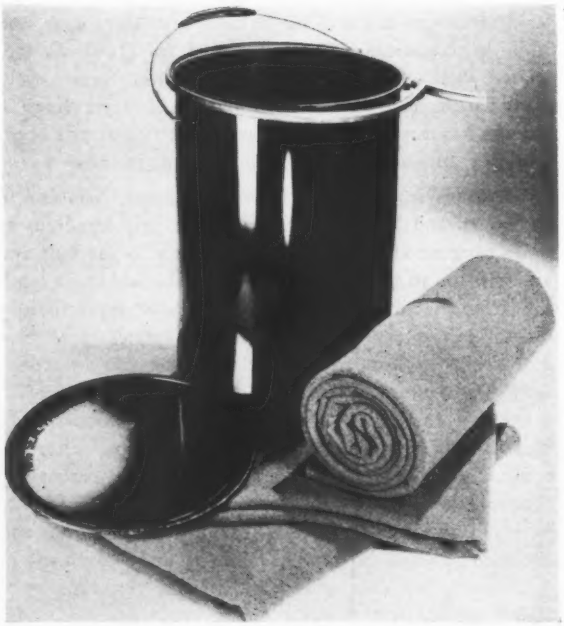
To supply our invading forces in Europe, Asia and in the South and North Pacific, we must ship hundreds of items ranging all the way from clothing to gasoline and ammunition in containers that can withstand crash landings from the air, submersion in salt water, repercussions from shell fire, poison gases and extremes of climate encountered in a global war. Because tin cans are strong yet light, easy to handle and store—because they keep out gas, moisture, air, dirt and germs and are non-corrosive, they have been commandeered to do this job. They are being used to encase signal flares, bomb fuses, percussion caps, demolition bombs, blankets, fishing tackle for life rafts and hundreds of other items. In the Solomons and in the invasion of North Africa, Sicily and Italy many of these items packed in air- and watertight cans were floated ashore from ships.

A typical example of the technological and economic contribution that the science of can manufacturing is making to the war effort was described recently by one of our foremost newspapers. In the *New York Times* for September 21, 1943, appeared the following news item under the head: "Can Making Speeds Fuses—Coffee Container Machines Used to Save $3,000,000":

> Methods used in manufacturing coffee cans, applied to at least one naval magazine, have speeded up production five-fold and decreased cost to from one-third to one-ninth of the cost under prewar methods, saving over $3,000,000.
>
> Before the new technique was adopted by the Navy, fuse containers were made by hand by sheet metal workers and tinsmiths. After fuses were packed at loading plants, the containers were sealed in these plants by hand-soldering.
>
> Machine methods have now been substituted, the same methods used successfully for years in producing hundreds



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6. Complete fishing kit in a tin can is part of life-raft and lifeboat equipment. 7. Metal can is airtight, watertight, damage-proof container for three Army blankets—lifeboat equipment. Photos Can Manufacturers Institute.

of millions of cans annually. Machine-sealing is used at the loading plants.

In actual tests the new machine-made, machine-sealed containers are shown to be superior to the old handmade ones. They keep the fuses in better condition so that they are more reliable in use. They will withstand fifteen times the pressure without leakage. No duds result from their use. They have the same reliability as metal containers for perishable foods.

Tin cans have been put to many new uses in the present war. Some of them are military secrets, but a few can be described. There is a portable still for life rafts which converts salt water into fresh water. This still is encased in a water- and airtight can because its fuel must be kept dry or the still will not work. There is a can containing a chemical which, when opened and tossed from a life raft or boat, spreads a splotch of yellowish-green color over a large area of water. A pilot in a searching plane, even at 10,000 ft., can spot this brilliant distress signal. There is a can which, when tossed into the water, inflates a balloon which soars 300 ft. into the air carrying aloft a radio aerial with the aid of which men shot down at sea can send out an S.O.S. from a portable radio. These, and many other uses that tin cans have been put to in this war, serve to emphasize values and services peculiar to tin cans which in peace times most civilians have taken for granted.

What of the present and the future so far as tin cans are concerned? Let us direct our attention to the present situation first. Because of the urgent requirements of our Army, Navy, Marines, Coast Guard and of Lend-Lease, the production of tin cans has been under rigid Government regulation since February, 1942. In fact, so many cans have been needed for so many purposes that, with the exception of certain food products which the Government has considered essential to civilian health and a small number of additional products which are also considered essential and which cannot be satisfactorily packaged in substitute materials, tin cans as containers have been prohibited for civilian uses. In normal times some 500 or more different products are packaged in tin cans. Today if a product falls within any of 93 classifications listed in Order M 81 covering food products, or in any of the 50 classifications covering non-food products, it can be packaged in metal containers within certain government-stipulated limits as to quantity and to kind of container construction. The latest reports from all fields of container manufacturing indicate that, so far as the civilian market is concerned, there is a shortage today of all types of containers. Regardless of the cause—whether it be a lack of raw material, a lack of production facilities or of manpower—the fact remains that the era of substitution, when tin cans could be replaced with glass jars, or wooden boxes with paper cartons, is past.

The future, of course, presents quite a different picture. In normal times it is a fundamental truism that the product will be in demand which best serves the consumer at a price that is economically sound. Because tin cans have so definitely demonstrated their many and varied virtues in peace and in war, hundreds of items going to the civilian market will again be packaged in them. Many of these items will be products formerly packed in tin cans, many will be new items manufactured by firms that have discovered the virtues of this container as a result of its many new and successful applications as a war weapon. Because production lines which turned out peacetime containers are intact, because so many of the war items now manufactured by can companies are coming off the same machines that turned out peacetime containers, tin cans for the civilian market will quickly be available once the war is over and restrictions are lifted on raw materials.

XUM

The electrolytic-coating process

A war baby only in so far as its accelerated application is concerned, the development of electrolytic plate for cans started long before Pearl Harbor. Now, with plans for reconversion in the advanced blueprint stage, it is well to take stock of such wartime conservation developments, to see what the prospects for its future application may be. The widespread wartime adoption of this technique for use in cans has enabled us to save on tin to the tune of 67 per cent, a remarkable emergency achievement. But what of its future?

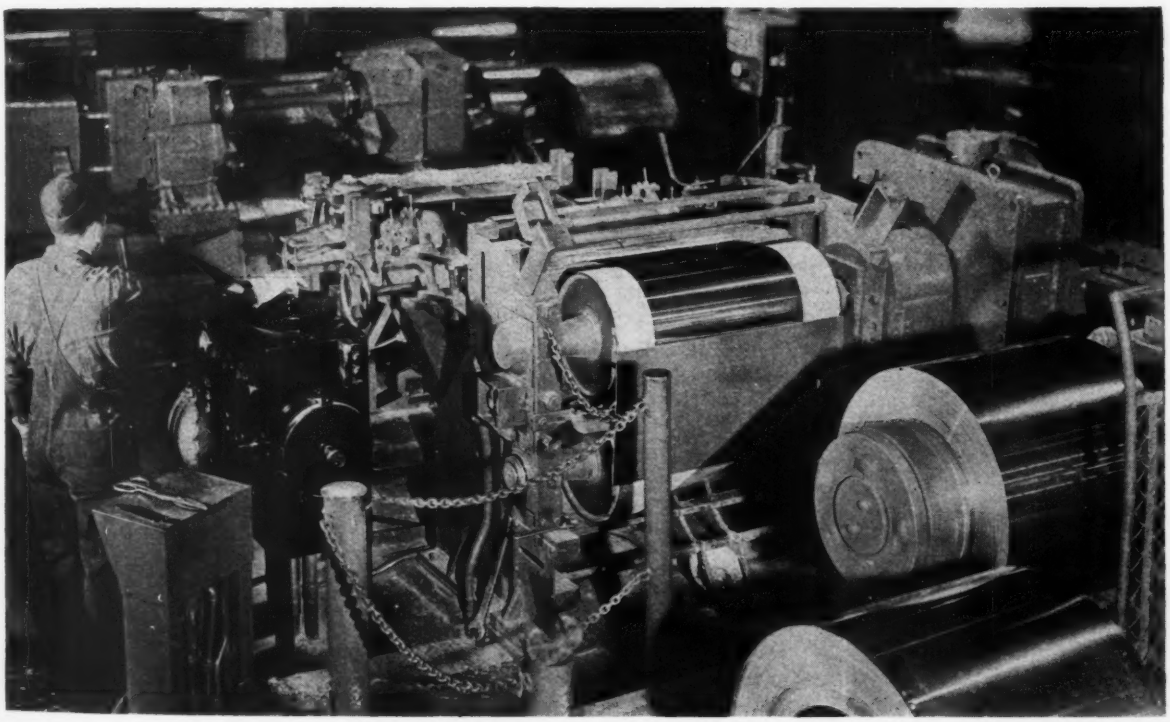
Much will depend upon further new developments, but the possibilities are that 0.5-lb. electrolytic plates (the standard employed at present) will be widely accepted in the postwar as containers for coffee, biscuits, shortenings and similar non-processed and non-corrosive products. Current research in connection with the minimum weight of electrolytic coating necessary to give a can a service life equal to that of hot-dipped tinplate holds the answer to the use of electrolytic plate in containers for such thermally processed foods as fruits and vegetables.

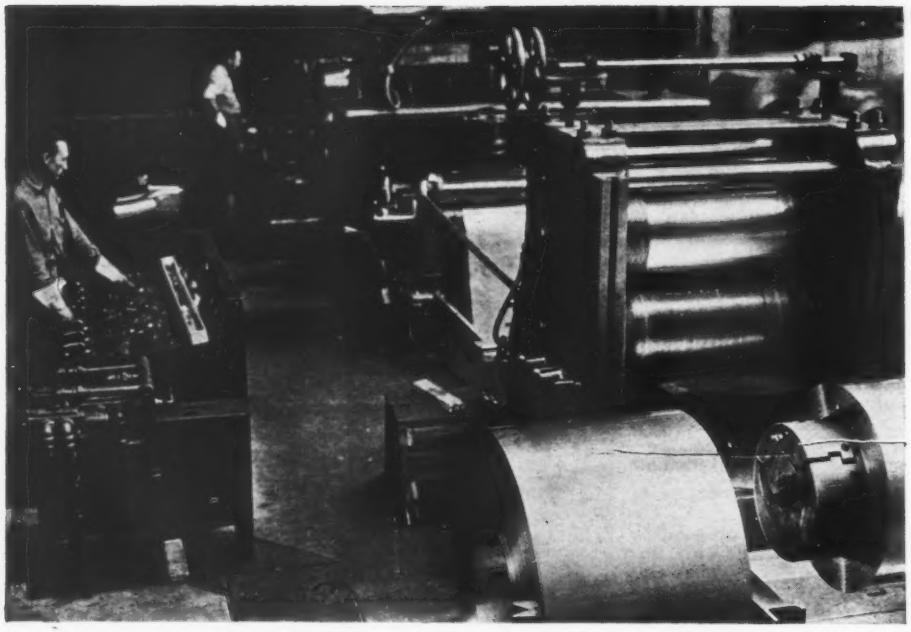
Research will also show whether coatings can be applied more economically by electrodeposition or by hot dipping. At present, electrolytic plate costs more to use than plain hot-dipped plate since the standard 0.5-lb. electrolytic plate must be inside-and-outside enameled to allow its use in processed cans. But a solution for this lies in the possibility that 1-lb. or higher electro-tin coatings will have adequate corrosion resistance without the enameling. They may replace hot-dip tinning if such coatings can be applied economically.

Development of electrolytic plate for cans started some years ago as a direct outgrowth of the continuous hot strip and cold reduction mills. The possibilities of continuous tinning on strip were revealed. It was foreseen that such a process might offer stiff competition to hot-dip tinning of individual sheets—or might replace it.

By 1937, a 0.5-lb. electrolytic coating of tin was used successfully on coffee can ends for the prevention of rusting under favorable storage conditions. It was plated from an acid bath, and then, to produce a uniform appearance, it was scratch brushed with nickel silver brushes. The 0.5-lb. weight seems to have been determined rather arbitrarily, probably because by its use one pound of tin per base box would be saved over the standard coke plate which had a pot yield of 1.5 lbs. per base box. However, heavier and lighter weights are now becoming available.

1. Equipment at Gary Sheet & Tin Mill of the Carnegie-Illinois Steel Corp. for slitting and recoiling cold reduced steel strip prior to processing on electrolytic tin-plate lines. Operation includes inspection for surface, flatness, and gauge.





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2. Side-trimming equipment in the Birmingham tin plate plant of the Tennessee Coal, Iron & Railroad Co. Two side-trimming lines trim the strip edges to provide a uniform width strip in preparation for processing on the electrolytic tin-plating lines.

The cost of enameling delayed the development before the war. However, electrolytic's merits came up again for serious consideration when really drastic reductions in the use of tin for food cans had to be effected. The usual prewar coating weight for hot-dipped plate was 1.5 lbs. per base box (pot yield). This was reduced to 1.35 lbs. by OPM in 1941, and WPB further reduced the coating weight for hot-dipped tinplate to 1.25 lbs. and restricted the products for which it could be used. But 0.5-lb. electrolytic coating offered a substantial saving of tin over this, and various steel mills made plans for the construction of additional electrolytic units of both the alkaline and acid types.

Enamel adhesion

In general, unenameled electrolytic cans, even when packed with relatively non-corrosive products, have not been too satisfactory. On the other hand, the enameled plates have given a good account of themselves. This was the case in the early experiments with the material, and tests made in 1942 with the best electrolytic coatings then available again demonstrated the fact.

Whereas enamels are used on hot-dipped plate to prevent bleaching of colored fruits and vegetables, and not to increase corrosion resistance, it is necessary to enamel electrolytic tinplate used for processed product cans in order to insure adequate resistance to corrosive effects.

Higher standards for the adhesion of enamels to electrolytically coated plate are therefore believed to be necessary than for hot-dipped plate. In the former case, the film of tin is only one-third as thick as with hot-dipped plate, and even a mildly acid product will tend to detin the area surrounding a discontinuity in the enamel.

Synthetic enamels, especially heat-reactive phenolics, were introduced several years ago to replace the oleoresinous baking varnishes formerly used as can enamels. It is planned to use them extensively on electrolytic plate since they are more resistant than standard oleoresinous enamels. But the problem of adhesion has become a major one since phenolic enamels are sensitive to foreign materials on the surface of the plate. On the other hand, there has not been much difficulty in obtaining adhesion of oleoresinous coatings to electrolytic plate.

Solderability of electrolytic

The problem of solderability was one of the first encountered by users of electrolytically coated tinplate. However, considerable progress has been made in this direction since 1937, the most crucial development being the use of silver-lead solder which made electrolytic tinplate cans possible. As a matter of fact, a silver-lead solder bond of yroper composition on electrolytic plate is stronger than the standard 40–60 lead solder in hot-dipped plate. A difference exists between the soldering characteristics of alkaline and acid electrolytic plates, but both, when proper techniques are employed, may be soldered successfully at commercial speeds.

Rust resistance

The presence of this characteristic is almost in direct ratio to the weight of the tin coating. If the electrolytic is less than 0.5 lb., cans made from it will rust considerably in storage. But at 0.5 lb., the plate is resistant enough to be satisfactory if handling and storage conditions are good. Even in the case of cans with electrolytic ends not outside enameled, there have been few complaints. However, for wartime shipping, outside enameling is safest.

The enamel—It has been found that enameled 0.5-lb. electrolytic plate is more rust resistant when it is exposed to the elements than is plain 1.25-lb. or even 1.5-lb. hot-dipped plate, and the difference between the performance

of enameled 0.5-lb. electrolytic plate and enameled 1.25-lb. hot-dipped plate is slight. The enamel itself is a very important factor, and it has been found that when samples are exposed directly to the atmosphere, the choice of enamels is more important than the choice of plates.

The base—However, in regard to rust resistance, the role of the steel base to be plated is of the utmost importance. Hartwell* has given a detailed discussion of the effects of the presence of various elements upon corrosion resistance of hot-dipped plates, and it has been demonstrated that his conclusions also apply to the base of electrolytic plate.

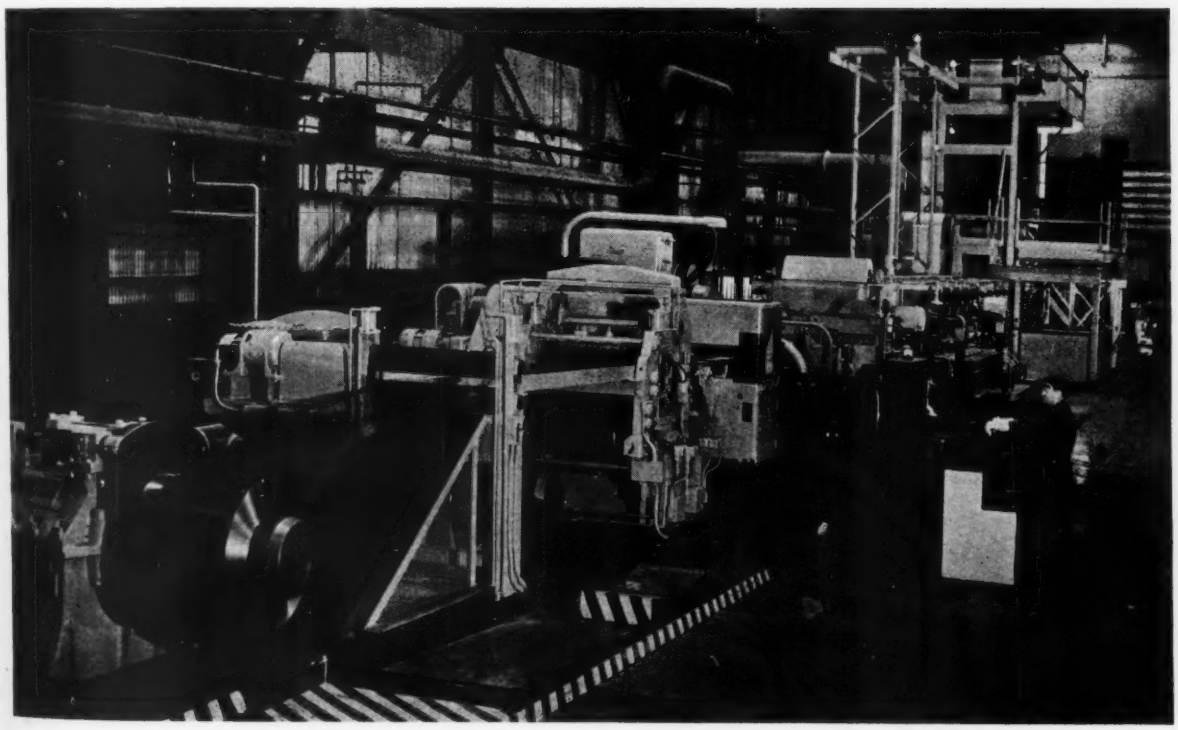
Corrosion-testing techniques

In normal times, corrosion resistance has been tested by periodic examination to record the number of hydrogen springers and perforations. Hydrogen springers are cans which flip out at the ends because of hydrogen pressure formed by corrosion. Perforations occur on enameled cans when localized action takes place. The shelf or service life of a can is the time required for these defects to occur at a certain temperature. Corrosion resistance of plates has usually been compared numerically by stating the number of days required for 50 per cent of the tested cans to fail. In this procedure, several years are required for testing. During the emergency, testing can be accomplished much more quickly by periodic flip vacuum tests made by an apparatus which applies external vacuum to the ends of cans to overcome the vacuum inside and cause the ends to flip out. If the vacuum inside the can has been dissipated by hydrogen formed through corrosion, it takes less external vacuum to flip the ends, and the rate of corrosion can thus be tested.

* R. R. Hartwell, *Surface Treatment of Metals* (1941), p. 69; *Sheet Metal Industry* (1941), pp. 172, 1017.



3. Beginning of the electrolytic tin-plating process, in the Irvin, Pittsburgh, works of the Carnegie-Illinois Steel Corp. These lines produce a lighter coating of tin than can be produced on hot dip-lines. 4. Inspector watches the strip after it has passed through melted coating.



Melted vs. unmelted electrolytic plates

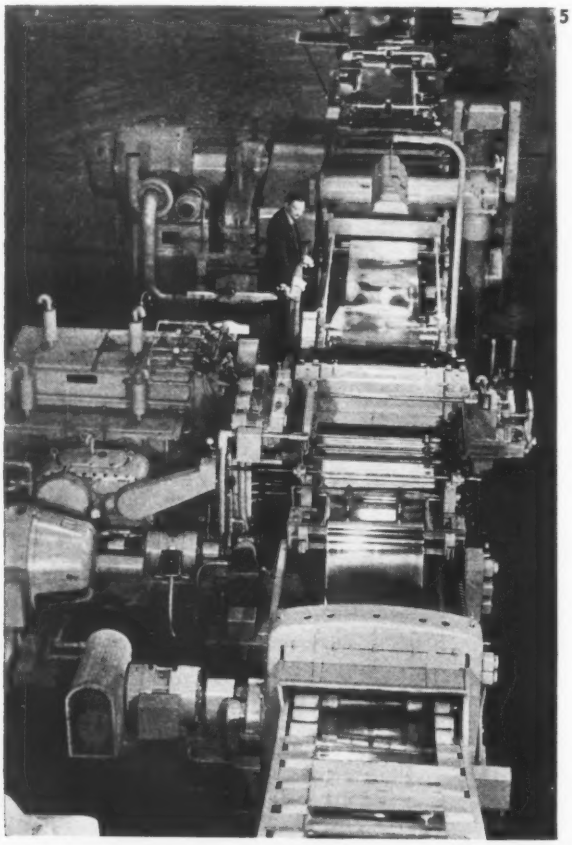
In tests of plain electrolytic cans made to compare melted electrolytic plate with the unmelted plate—either brushed or matted—it was invariably found that the melted plate had better corrosion resistance than the unmelted. In addition to superior corrosion resistance, the better appearance, increased solderability and greater resistance to external rusting have caused the favoring of melted electrolytic plate by can manufacturers.

Chemical treatments—The chemical treatment given an electrolytic plate after melting affects its corrosion resistance. Such treatments, first developed to produce oxidation during the baking after enameling, also have been helpful in improving enamel adhesion to alkaline electrolytic plate. Tests have shown that chemical film on the plate may be important in corrosion resistance of plain electrolytic plate cans packed with fruits.

Composite cans—Tests of cans with enameled electrolytic ends or enameled Bonderized steel ends on hot-dipped bodies have been satisfactory even in the case of moderately acid fruit products. For non-corrosive products such as meats, fish, peas, corn, lima beans, cans with electrolytic bodies and enameled electrolytic or enameled bonderized ends have tested well.

The area in hot-dipped enameled cans where most corrosion occurs is at the side seam since the plate is enameled in the flat and the bodies formed from the sheets. The working of the metal fractures the enamel along the inside of the side seam and exposes the base plate. In beer cans, a stripe of enamel applied after soldering was used to protect the area. In the case of full enameled electrolytic cans, side-seam stripes have been effective. However, the side-seam stripe does not help eliminate localized corrosion on the counter-sink of the ends on full-enameled electrolytic cans packed with mildly acid products. Therefore, until the plate is improved, it will not be possible to use even full-enameled 0.5-lb. electrolytic cans for packing mildly acid products.

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5. Finishing end of electrolytic tinning line in Irvin plant of Carnegie-Illinois Steel Corp., showing roller leveller, shear, and final inspection. 6. Operator in American Can Company plant feeding ends into a closing machine which double-seams one end on can body. 7. Inspector checks cans emerging from testing machine.

7



The bonderizing process

Bonderizing of steel, as well as the electrolytic tinplating process, has been of immense help during the war in maintaining an adequate supply of cans despite drastic curtailment of the tin supply. Even an early end of the war in Europe will not relieve the tin shortage and it will be necessary for the packaging field to continue the study of Bonderite-K and all other tin-saving mediums.

Experimental and development work is still proceeding to improve and extend further the application of Bonderized steel to the can and closure industry. How far this may carry the material for other than emergency use will, of course, depend on the character of findings.

To date there is evidence that Bonderized steel should win permanent acceptance in the can, container and closure field to a considerable extent. Its ability as a base for applied organic finishes makes practical its use in the general-line can field—for coffee, tobacco and similar items. For bottle crowns and other closures, it has also met manufacturing and use requirements very well. By eliminating tin on the cans for less corrosive products, such as peas, corn and meats, tin is made available for the packaging of the more corrosive fruits.

The supply of blackplate is no longer critical. Indications are that steel will be increasingly available for civilian needs this year. But tin is still critical and unquestionably will remain critical until Malaya is recovered from the Japanese and production and shipping re-established. Hence, a process which permits the production of cans from steel without the use of tin takes on added importance at this time.

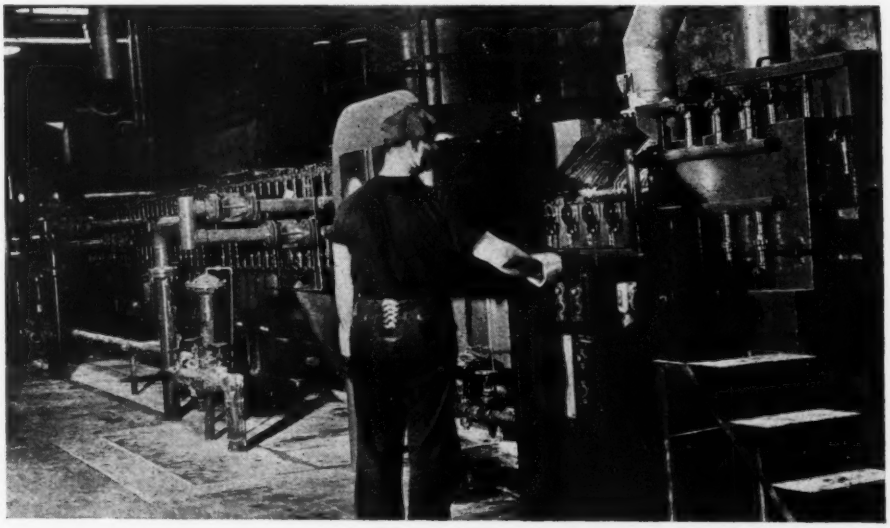
Based on the consumption of tin by the can-making industry during the prewar years, the tin requirements were, in 1940, for instance, approximately 30,000 tons and under normal conditions probably would have reached a total consumption of more than 40,000 tons in 1942, based on the prewar standards of 1.5 lbs. of tin per base box of sheet steel.

It is estimated by those in close touch with the situation that for the next few years the supply of tin from all sources which will be available to the canning industry will average around 19,500 tons per annum for just the necessary container manufacturing, which leaves a considerable margin between the visible supply and ordinary requirements. This visible supply includes the stockpile on hand as of January 1, 1942, the amount that can be produced by the new smelter, now in operation in Texas, recovery from can makers' scrap and from used cans.

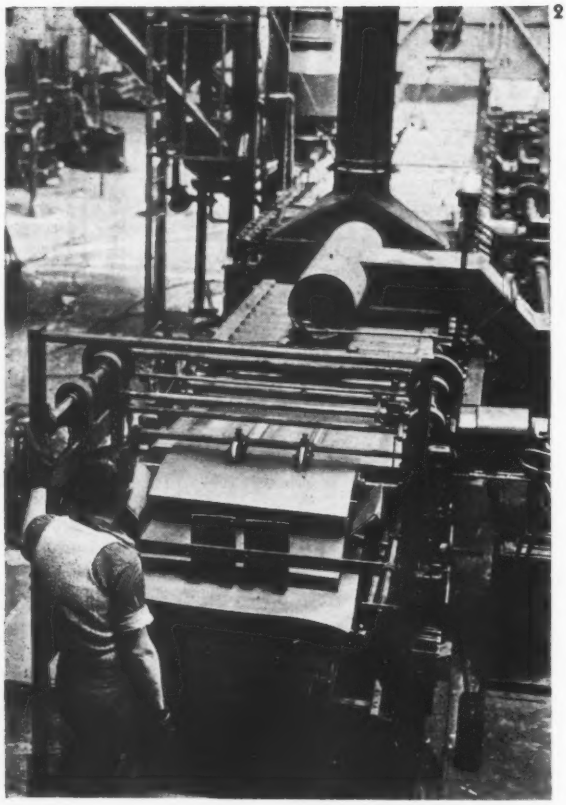
While this difference between ordinary requirements and the actual supply presents both a problem and a challenge to the canning industry, that industry was not caught wholly unprepared. Long before Pearl Harbor, research laboratories for the can makers, steel mills and chemical companies—including the Parker Rust Proof Co., the originators of Bonderite-K—were working on methods that would relieve the demand for tin for metal containers. Experiments on finishing methods that would save tin were already under way and before the smoke had cleared away over Honolulu, realistic plans were in operation to produce metal containers without the use of tin at all.

A primary problem in can-making with Bonderized sheets has been that it was necessary to remove the Bonderite from the soldering strip before successful soldering could be effected (MODERN PACKAGING, August, 1942, pp. 35–36). A leading can manufacturer now reports that the problem of soldering Bonderite has been solved technically on an experimental scale, although as yet the method and equipment for performing the operation

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1. The Bonderizing unit at Gary Sheet & Tin Mill, Carnegie-Illinois Steel Corp. The complex phosplate film applied in this process to the surface of the blackplate makes possible such adhesion of lacquers and enamels that in canning some non-acid fruits and vegetables, tin is unnecessary as a can liner.



2. Sheets of tin plate are fed into the Bonderizing unit in a manner reminding the observer of a printing press. Coating retards corrosion, provides a base for lacquer.

on a commercial scale have not been worked successfully.

The distinctive color of Bonderized cans has not proved to be a handicap. Bonderite in any case must be lacquered to provide full protection from corrosion and rust. Some of these lacquers are clear and some are opaque and in various colors. The lacquer most frequently used is that approved for Army ration cans, which gives a golden-bronze finish. Civilian products packaged Army-style in this golden can, with label information lithographed directly on the can, have been on the market for some time and have met ready acceptance. Apparently the consumer is attracted by the appearance of the can, rather than in any way repelled by it.

It has been impossible to set up an accurate comparison of the cost of the Bonderized can with that of the tin-plated can. Can-makers feel, however, that the Bonderized and lacquered can may at present be slightly more expensive than the tin can—not simply because of the cost of materials but also because of various handlings and hazards, rejects, etc.; problems which have not yet been completely licked. Actually, Bonderite is at present a substitute for an unobtainable material and cost, within reason, is not an important factor. It probably will be impossible to make any worth-while comparison until both types of materials are fully obtainable on a normal basis and at prices governed by the normal operation of the law of supply and demand.

The operation of producing Bonderized steel sheets suitable for cans is completely mechanical from the time the sheets are automatically fed into the Bonderizing equipment. As the sheets or strips pass through a series of rollers, contained in the machine, the Bonderizing solution, which is supplied by the Parker Rust-Proof Co., is sprayed on the metal through a series of nozzles, which produces a fine-grained phosphate coating and will withstand the drawing, bending and rolling operations incident to the manufacture of cans, bottle caps, and similar packages and closures. The Bonderizing process takes only 10 to 15 seconds. Applied over a Bonderized surface, organic coatings provide a degree of protection that is not possible on untreated steel surfaces. In addition, Bonderizing provides a degree of protection from rust to the steel sheets on their way from the steel mills to the can factories.

The application of Bonderizing to sheet steel for cans is more than an emergency development, as research work was going on long before war started. Thousands of test packs have been made with all kinds of fruits and vegetables under the usual and extreme conditions of canning and storage. Canners and can manufacturers have been making test packs with Bonderized cans and subjecting them to tropical, sea atmosphere, and other severe and normal tests. The results have been so satisfactory that Bonderized steel is now accepted for many types of foods, as well as certain rations for the Army.

Both the American and the Continental Can Co's. have been especially active in this development. Through the courtesy of Dr. Roger H. Lueck, Director of Research of the American Can Co., the illustrations on p. 625 show the result of some of this company's tests on Bonderized and non-Bonderized cans.

Fig. 3 is a microscopic study comparing plain blackplate, at left, with Bonderized blackplate at right. Fig. 4 shows the result of a thermal processing test made on two cans, one of Bonderized steel and one of untreated deoxidized steel, both finished with the same organic coating. The can at right illustrates underfilm corrosion, a mass of hairline rust formation which develops under clear organic films applied to untreated steel when exposed to the atmosphere. The rate of formation is dependent on the humidity and the moisture-vapor impedance of the organic film. As shown in the can at left, this effect is completely eliminated with Bonderized plate, regardless of the type of can enamel employed.

Quoting from Dr. Lueck's paper given at the June 16, 1942, meeting of the Institute of Food Technologists: "On the inside of the can the effect of Bonderizing the steel surface is especially apparent. There, without the phosphated substrate, all organic films, some more than others, undergo a loss of adhesion in contact with most foods, particularly during the thermal sterilizing process. Any loss of adhesion is followed by rapid corrosion of the steel, resulting in hydrogen swells, discoloration and the presence of enamel particles in the food."

Fig. 5 is shown to illustrate the effect of the Bonderizing treatment on adhesion of coatings on the inside of cans, the adhesion being determined semi-quantitatively

by the cellulose-tape test applied to the film after the can had been emptied and washed. In Fig. 5 it will be observed that adhesion is still effective on A (the Bonderized sample) only partly effective on B (phosphoric acid treatment) and very poor on C (deoxidized steel) as the cellulose tape lifts practically all of the organic finish. D, E and F show the results of the same test applied to double organic coatings on, respectively: Bonderized steel, phosphoric acid treatment and deoxidized steel.

Fig. 6 shows the effect of surface treatment on the adhesion of protective coatings on the outside of cans, with deoxidized steel, at left, compared with the Bonderized steel, shown at right.

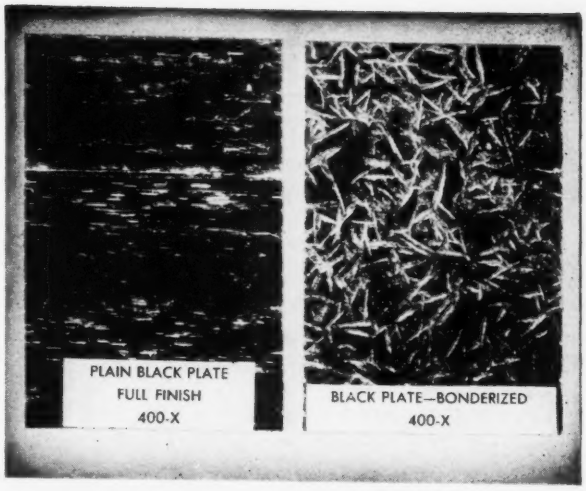
Since the first pilot machine was installed some two years ago in the Carnegie-Illinois plant at Gary, more than a score of huge Bonderizing machines have been placed in operation in various steel mills.

On a typical automatic Bonderizing machine, the stacked blackplate is mechanically fed in at the rate of 120 ft. per minute. Running through rubber rollers, the deoxidized sheets are subjected to the Bonderite-K chemical for 7 seconds; then are put through a cold water rinse and finally through chromic acid.

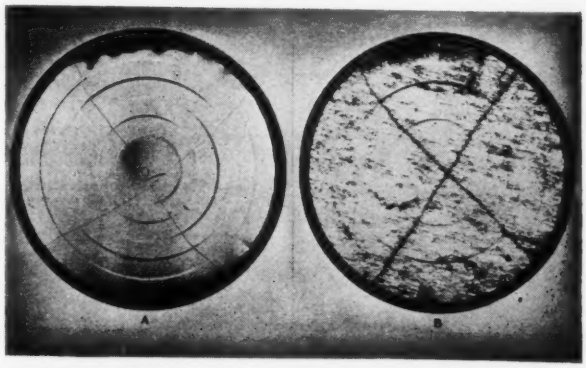
Investigators estimate that at present rate of consumption the visible world supply of tin will run out in about 20 years. Even after the present Pacific situation is cleared up and the tin deposits now held by Japan are released to normal channels of trade, they say that not only must the visible supply be used sparingly, but search must be made for new deposits and use must be made of every available method of tin conservation that will provide comparable protection for metal containers, at least temporarily. The end of the war will not suddenly permit return to complete freedom of the use of tin, as time will be required to reopen mines, re-establish trade channels and facilities. For ultimate safety of the tin supply, it may take years to discover new tin deposits and many more years to develop them if and when they are found.

Thousands of dollars are already invested by can manufacturers and steel mills in equipment for the application of Bonderizing and supplemental organic finishes. This may well prove to be a life saver in keeping canned foods moving to fighting forces and adequate supplies going to war workers here at home who need plenty of vitamins to keep them healthy and full of energy for the tough job ahead. Lend-Lease shipments of food in these metal containers will also help keep our Allies in fighting form.

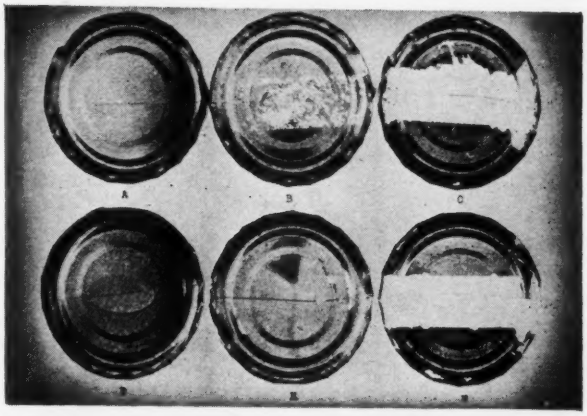
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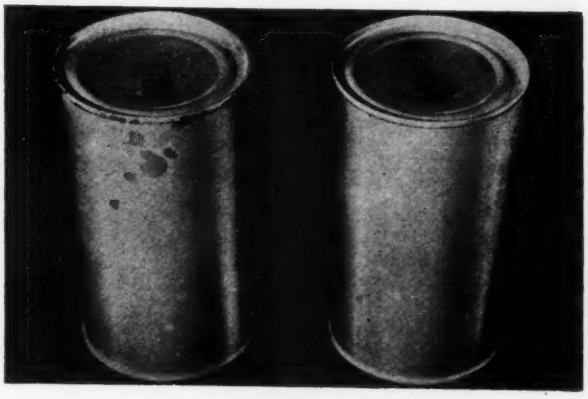
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3. 400-Power magnification compares Bonderized (right) with plain blackplate. 4. Underfilm corrosion tests show untreated deoxidized steel (right) with rust formation. Bonderized (left) is unaffected. 5. Effect of surface treatment on adhesion of single coatings (top) and double coatings (bottom). A and D are Bonderized; B and E phosphoric-acid treated; C and F, plain deoxidized steel. 6. Effect of surface treatment on adhesion of outside protective coatings shows poor results on deoxidized, (left). Bonderized can, (right) is unaffected.

Can decorating

by William N. Misuraca

Some day, we hope very soon, the peace will be won and the horrible business of war over—then the metal decorating industry will return to civilian life much in the same manner as the average doughboy will shed his olive drab uniform for his preferred herringbone or tweed, and his favorite flashy tie.

Color—and lots of it—will be the order of the day, and eye appeal will once more influence the buying public's choice.

Just how many products packed in metal containers in prewar days will reappear on the market in the old familiar label and how many will be dressed up in a different manner, is problematical. However, it is to be expected that a certain percentage of manufacturers will take advantage of the present lull in the production of fancy metal packages to redesign the old label, to make its appearance more appealing and attractive. All of which is in line with a logical modernizing program, but the question is often asked: "What has the metal decorating industry to offer that's new and in keeping with all the latest developments that we are given to understand are in the offing?"

Unfortunately, the buying public at large has gained the impression that many, many new developments are available, their release on the market awaiting only the day when hostilities cease. Of course, we of the metal-decorating industry have not been idle during the emergency. Sandwiched in between our war efforts, in anticipation of the day when all restriction will be eliminated and full sway can be given to the accumulated knowledge, we have tried to assimilate whatever new developments are adaptable to our product. Nevertheless, it has to be realized that much with potential application to metal decorating must await changes in the existing equipment, changes which at this writing are not possible, before it can be fully developed. Application of new developments must be postponed until a more opportune time.

Since the method of metal decorating is essentially a lithographic process, we must also look forward to developments in that industry which are applicable to ours, and so we learn of a plastic lithographic plate, of a press that utilizes electronics for the transfer of ink from the litho plate to the metal sheet, of new methods of color separation in the reproduction of designs for labels, etc. While the foregoing is very interesting and gives us much

1. This form of decorating and use of metal for many products—forbidden now—will return. Photo National Can Corp.

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XUM

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2. Can labeling by direct application of lithography on metal is particularly advantageous for products like these. Oils, varnishes and lubricants do not deface package surface, while powdered soaps do not lose identity when handled by consumers. Photo Continental Can Co.

food for thought, there remain two principal points that require our immediate attention: firstly, speed of production; secondly, the quality of the finished product. Speed of production, of course, must of necessity depend upon special equipment which at the moment cannot be relied upon. That does not, however, apply to the quality of the finished product, for most informative knowledge on that score is available at present—the only restrictions being those which the emergency requires.

Obviously, it is possible to discuss only that information which is at the disposal of the metal decorator today, and it must be realized that, due to war limitations, even such information is meager and only tentative.

Much has been said and intimated regarding the part plastics will play in supplanting metal packages for some products, and we hear of aluminum as the ultimate in metal containers, and magnesium, and paper, and chemically treated blackplate, and so on. But little or nothing is said about the fact that metal containers still remain a most logical packaging medium, and when lithography is used directly on the metal, they have a finish that leaves little to be desired.

Synthetic resins, in the form of coatings, either transparent or colored, have for a long time been utilized in the technique of metal decorating. In fact, it is due to these resinous coatings that such packaging milestones as the putting of beer in cans have been possible.

How much more extensively these types of finishes will be used in the future cannot be hazarded, but it is not difficult to understand that the knowledge we possessed in regard to synthetic resins has increased ten-fold since the beginning of the war, that manufacturing facilities for producing such resins have been multiplied in like proportion, and that an outlet should be found for such products.

We like to visualize a metal decorated package having a metal inner core, the inside covered with a synthetic material resembling plastic—practically odorless, tasteless, and resistant to most products—the outside also covered with some synthetic material easy to lithograph in a variety of colors and possessing a glass-like finish, both washable and chip-proof. While such a metal package is not easy, at the same time it is not impossible to produce, and would solve many a packaging problem.

Those of us who have looked upon any metal package as "just another tin can" have learned through this war era that the "lowly tin can" has been so highly developed in manufacturing—both in the speed of production and in the efficiency in the package itself—that nothing has entirely supplanted it as yet. Its standing as a simple and efficient container remains unimpaired. This statement is not made to the detriment of the efforts expended during this emergency to produce a substitute package comparable to a tin can or to a lithographed metal container, but rather to impress upon the reader the fact that much that has been conveyed to the buying public regarding the many novel packages which will be available immediately after the war—and which will revolutionize packaging—has been generality.

Of course we will see some novel packages because the packaging industry is always on the lookout for new developments, but they will come at the proper moment and only after there has been plenty of time for readjustments. In the meantime, we are looking forward to the day when color will again be the order of the day and lithography, as applied to metal decorating, will produce that high quality of work for which it has been deservedly famous for many years.

XUM

Fibre-bodied cans

The fibre can has been commandeered for a lot of jobs it never did before. Metal conservation orders have seen to that. But these same restrictive orders have also drastically limited the number of products which can use metal-end fibre cans.

For direct war work, the fibre-bodied can is finding a multitude of uses. One of the most interesting is for individual shells which are packed in spiral-wound fibre canisters with metal ends and telescope-type closure.

Lubricating oils in fibre cans are another war product. The nature of oil requires an interior protective coating. Lithographed or printed labels on the exterior make these new paper containers resemble the conventional metal lubricating oil can.

Perhaps because paint is so widely known and commonly used by the consuming public, its new packages have attracted considerable attention. Some of these are easily recognized as new, but many are scarcely distinguishable from the old in appearance and function.

One of the most striking paint packages to be developed is being used by one of the major paint companies. It consists of a can made of spirally wound kraft strips, with an inner lamination of metal foil. The package was developed by the company's own engineers, who also set up the can manufacturing equipment, consisting of second-hand machines and homemade conveyors.

Selection of fibre

Because of the extensive variety of products to be packed, there can be no one standard body construction of fibre cans. Each specific product must be thoroughly analyzed and so must the fibre materials in which it is to be housed. Products that are hygroscopic, or that will deteriorate if exposed to humidity, are put into containers of moistureproof material.

Types of fibre containers

The fibre cans expressly used for dry products may be divided into nine distinct types, all of which are made in a wide variety of sizes and shapes. The physical construction of each type will vary somewhat, depending upon production considerations and equipment of the manufacturers. The following constitute the most popular types:

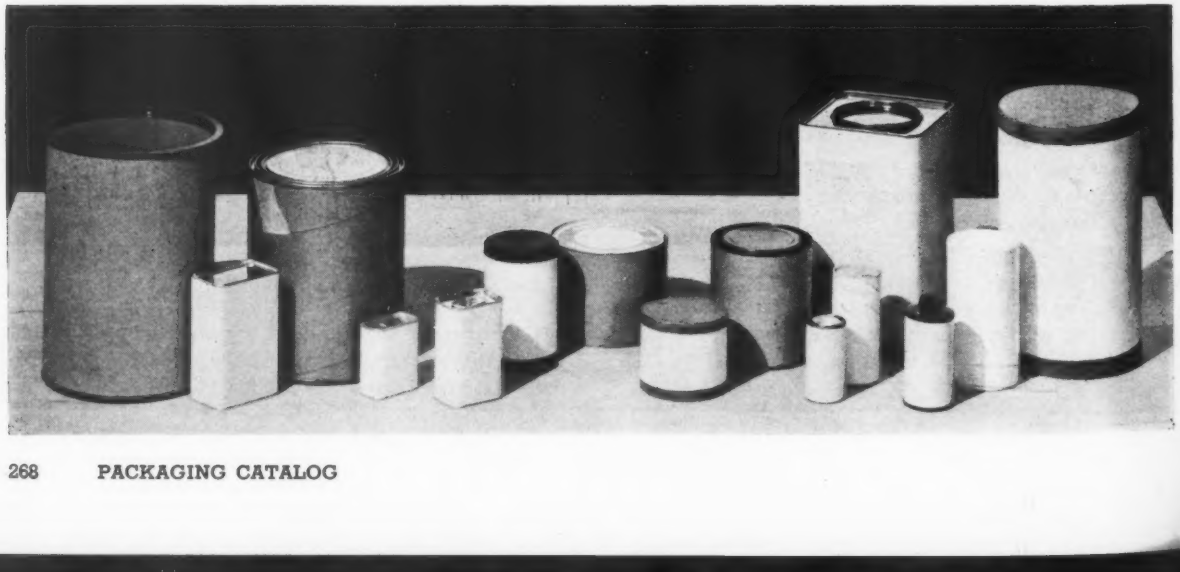
Paper cap cans—The fibre can with a paper cap is ordinarily limited, because of technical considerations, to cylindrical shapes, although a few oval cans have been introduced into the market. This type of can is constructed with fibreboard ends, or so-called paper caps. These ends are either removable or sealed on, depending upon the requirements of the user. The top end may be fitted with a pouring or sprinkling device for dispensing the contents. The caps are furnished in a variety of colors and, within limitations, may also be embossed or printed. Labels may be applied directly to the body of the can by the maker; or the user, after filling the container, may affix the label over the flange of the cap and thus seal the package.

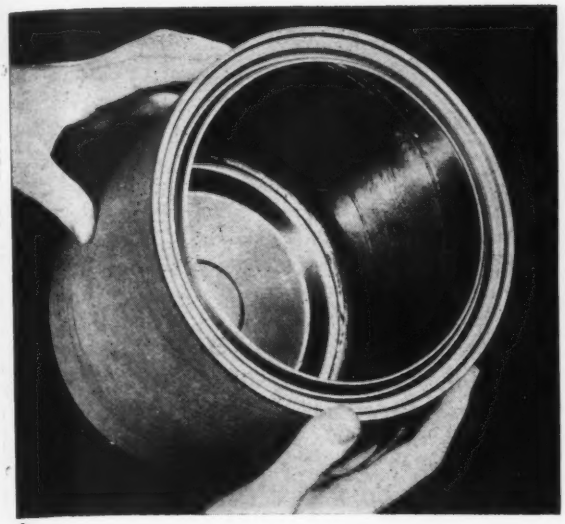
Friction-plug-top cans—The friction-plug-top fibre cans with metal ends seamed onto the body are manufactured with round, oblong, oval or square bases. The plug is clamped securely in place by friction and can be pried loose without damage to the container.

Metal-slip-cover cans—The metal-slip-cover fibre can, which is made preferably on a small oval or round base, is an economical container for products requiring a full opening. If labels are to be applied over the flange after filling, the cover should have a raw edge; otherwise a curled flange is desirable.

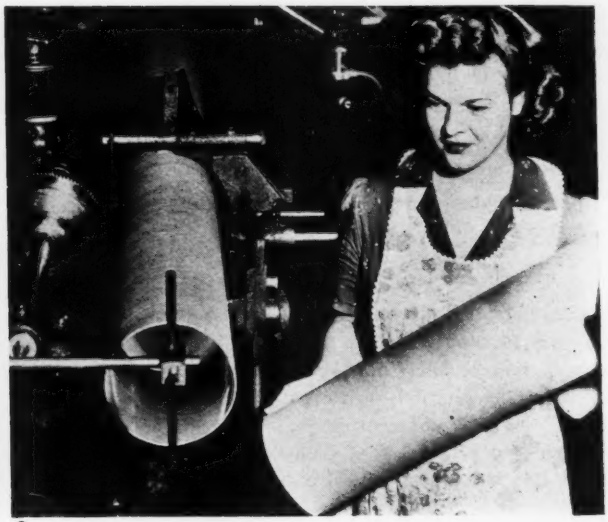
Interrupted-thread-cover cans—This so-called interrupted-thread device allows the cover to be easily re-

1. Standard types of fibre-bodied cans, showing the variety of sizes, shapes and kinds of tops. Photo American Can Co.



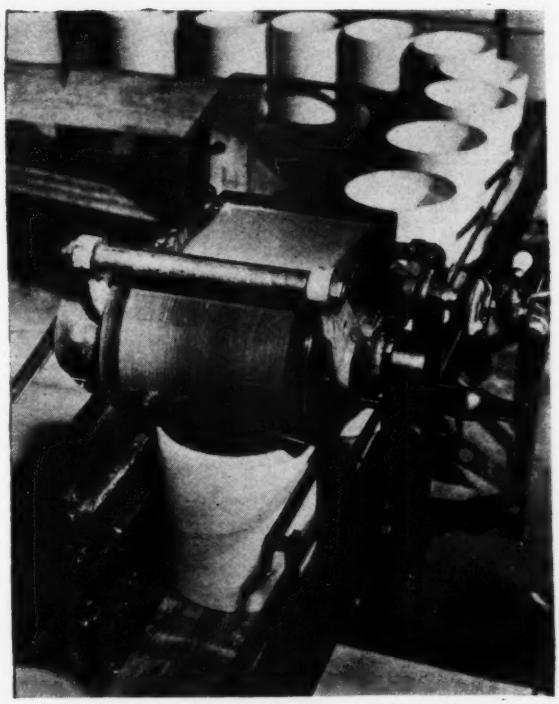


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2. Paint can made of paper with metal-foil lining. Strips of kraft and foil are spirally wound as in standard manufacture of fibre-bodied cans. 3. Can body is formed as a long tube, cut off in lengths for convenient handling, later cut to gallon and quart sizes. 4. Conveyer lines devised from makeshift materials carry can bodies under automatic gluing device which coats them with solvent-proof adhesive, suiting them for holding paint. 5. Top and bottom rims are crimped on by machine—the final operation in the fabrication of a metal-saving, leak-proof paint can. Photos The Sherwin-Williams Co.



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moved by a slight twist of the hand, and yet when assembled, the container is securely locked. The full opening in the top allows easy access to the contents of the can. A drumhead seal may be affixed to the top.

Closed-top cans—This type of can makes a tamper-proof non-refillable package in that both the top and bottom are made of metal seamed onto the body. The top may, or may not, be fitted with revolving or push-slide dredges, pouring spouts, or semi-perforated knockout holes. These containers make excellent packages for scouring powder, spices, birdseed, insecticide, etc.

Planetary-top cans—This can calls for a two-piece top, an under-cap crimped onto the body and a revolving over-cap, usually of some finished metal to provide a high-lustre end of striking appearance. The tops have a variety of sifter-hole arrangements, often carried out in some design motif.

Raised-neck-top cans—The top of this can consists of a raised neck assembled to the body of the can, perforated with single or multiple openings, depending upon the nature of the contents. This type of container is generally used for talcum or tooth powder.

Telescope cans—Three interlocking sections are required in the manufacture of telescope cans: an inner tube and an upper and a lower outer tube. These fibre segments are fitted together so that the outer tubes act as closures for the inner tube. This package is used as a tamper-proof mailing case.



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Screw-top cans—There are two styles of screw-top cans: on one the fibre body is threaded outside at the top; on the other type a threaded neck protrudes from a crimped-on body, to which the cover is assembled.

Spirally wound fibre cans

The adaptability of the spirally wound fibre can is manifold since its construction allows the use of many different fibres and adhesives, thus serving the desired requirements of any number of products. In the manufacturing process, ribbons of fibre are wound around a steel mandrel, the diameter of which is the same as the inside diameter of the can to be produced. As these ribbons are wound on the mandrel at an angle, one over the other, and so placed that the top one overlaps the joint on the under ply, it is possible to produce a tube of any desired length and construction.

Since the original tube from which the bodies are made is composed of several individual ribbons, almost any combinations of materials—glassine, manila, kraft, straw chip, etc.—can be used, and a ply of any of these materials can be introduced at almost any place in the body, to meet the requirements for which the can is intended. For instance, a body can be produced with one ply of parchment paper, another of almost any thickness of fibre, and a third, of some different material, while the fourth ply may be a ribbon of colored paper, which, wound on the outside of the tube, would make a colored can. Since the adhesive is applied to each individual ribbon, almost any adhesive can be used for any particular ply of ribbon. Spirally wound cans can be made only with round bodies, because the ribbons of fibre must slip around the mandrel, but this characteristic has its merits, because it permits continuous production, at a high rate of speed, with a resultant low cost of manufacturing. After the bodies are wound into tubes (in some multiple of the length of the can being made), strip labels, i.e., multiples of single labels, are applied by hand and the cans are then cut to the proper or desired length.

Convolutely wound cans

In the manufacture of the convolutely wound fibre can the ribbon is wound flush on a mandrel which revolves some required number of times and thus provides the necessary number of plies of fibre ribbon to complete the body. The ribbon is then automatically cut and the body moved along the mandrel to the position where the label is applied. During this second operation the body of the next can is being rolled. The completed body is then ejected from the mandrel, ready to receive its caps or ends which can be fibre or metal in a round body, but metal only in irregular shapes.

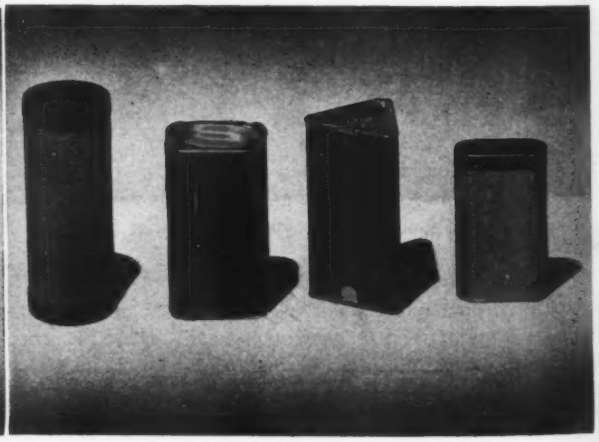
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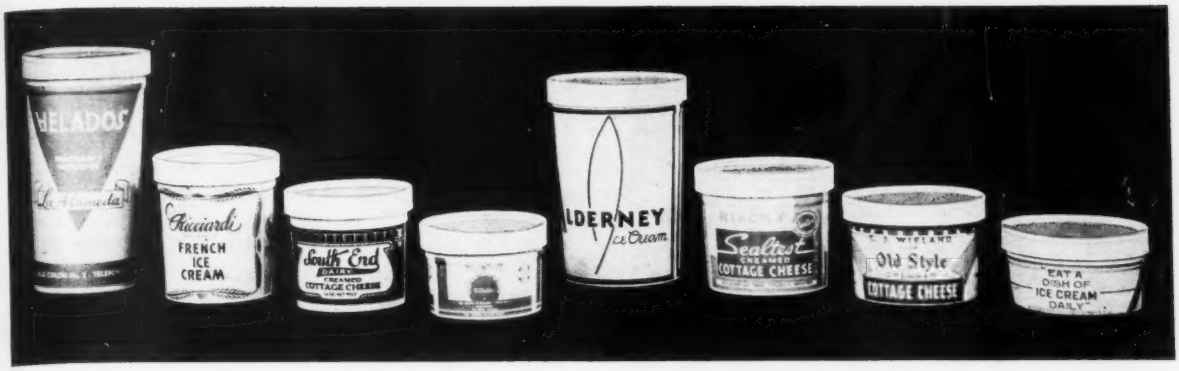
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6. An all-fibre can which is fabricated on standard can-making equipment that has been modified to handle fibre in sheet form. The process is the same as in the production of the familiar tin can. Photo American Can Co. 7 and 8. In normal times fibre cans are obtainable in many shapes: round, square, oblong, triangular, "obround" and oval. For added versatility, metal or fibre ends with pouring spouts or punch-hold sifters may be devised. The bodies of the cans may be so treated that they become moistureproof or greaseproof. Photo Sefton Fibre Can Co.



1. Liquid-tight containers for various dairy products in quart, pint, 12-oz. and half-pint sizes. Photo The Sealright Co.

Liquid-tight paper containers

The term "liquid-tight paper container"—like many expressions in the packaging field—designates a form of package which has extended its usefulness far beyond the purposes for which it was originally developed. First uses were for dairy products, such as cottage cheese and ice cream, and those products are still the big volume users. Today, with critical shortages of all packaging materials as the urge, these containers are being used for shortening, tobacco, lubricants and printing inks. New coatings and linings which have been developed seem to promise permanent gains for this type of package.

Cylindrical and slant-walled canisters are among the oldest type of liquid-holding paper containers. They are usually formed of a fine grade of bleached sulphite and are wax coated or otherwise treated to prevent absorption and penetration by water. The wax coating serves to stiffen the board to a substantial degree and this permits the effecting of a relatively tight seal by the use of die-cut paperboard closures which fit as friction plugs into the tops of the containers.

On cylindrical types, partially telescoping, overlapping lids are frequently utilized. One newly developed type utilizes slots, located slantwise in the side walls of these lids, to provide air vents which facilitate removal of the canister covers.

Pre-fabricated "bottles"

Developed originally for milk and cream and still largely restricted to this purpose are a number of types of so-called paper "bottles" pre-fabricated in boxmaking plants and shipped under sanitary conditions to the dairy where they are filled and re-sealed either on standard bottle-filling equipment or—in the cases of some types—on special machinery. These containers vary widely in

2. The liquid-tight container finds a new field as it bids for a permanent place as a shortening package. Photo Sutherland Paper Co. 3. Ingenious method of filling uses a mandrel to form the inner cellophane liner. Photo The Sealright Co.

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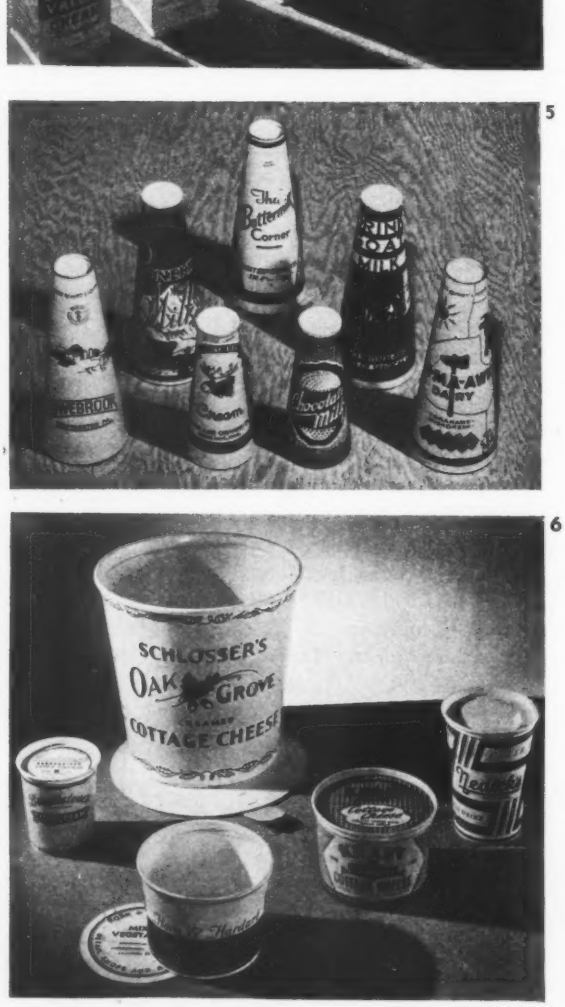
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4. Prefabricated rectangular "bottles" with stapled hinged closures. Supplied to dairy as blanks, these bottles are thoroughly sterilized before filling. Photo American Can Co. 5. Cone-shaped prefabricated bottles with metal-ring closure seals and paper closures make covenient dispensers for milk and cream. Photo Sutherland Paper Co. 6. Prefabricated containers with snap covers for hot foods, liquids, semi-liquids. Slanting side walls permit nesting for convenient handling in storage and shipment. Photo Lily-Tulip Cup Corp.

their structure, some assuming the form of truncated columns with metal inserts at the neck opening to provide rigidity and to permit of the use of plug-type paper closures. Others are rectangular in shape with tops and bottoms seamed to a formed side wall blank and with staple-attached closures.

Bottle "blanks"

Other types of paper milk "bottles" are supplied to the dairy as flat blanks and are erected and sterilized immediately prior to filling. Here again, shapes vary from the cylinder with pleated top through the cone with flat metal closure to the rectangular type with slanting top and side walls and an integral closure opening.

Liquid-holding bags

The development of water-holding sheets, such as rubber hydrochloride, has permitted manufacturers of products of a liquid or semi-liquid nature and of products sold in brine to use water-tight bags as their containers. Such containers, in the smaller sizes, are sometimes used in the form of a bag alone with heat-sealed closure. Larger sizes, requiring a rigid form for merchandising appearance, shipability or structural strength, are usually placed in folding cartons. Several applications of this sort are shown in the accompanying illustrations. In some instances, the transparent water-tight sheet material is laminated for reinforcement and greater strength.

Sanitation requirements

Paperboard containers for food products are usually manufactured of board specially prepared in a way to insure against contamination. The coating process, involving immersion or spraying with hot wax or similar materials, acts as a further insurance in sanitation. Great care is exercised by manufacturers to protect the containers against contamination during shipment.

Decoration

Paperboard liquid-holding containers may be decorated in a colorful manner. Printing usually precedes the impregnating or coating operation. Wax coatings, of course, have an effect on the printing which must be allowed for in planning the design. The general effect is to soften tones and lighten them to a degree.

Paper-container economies

There has been controversy, particularly in the milk field, over the relative economic desirability of glass containers as contrasted with paper containers. No clear-cut statement can be made since the relationship of costs varies with every dairy operation. In general, it may be said that the original cost of the paper bottle is less than that of the corresponding size of glass container. The cost per trip is a more debatable point, involving such factors as relative shipping costs, in view of weight differentials, bottle breakage, glass container cleaning costs, multiple trips of glass bottles as contrasted with single trips of paper containers, etc.

Collapsible metal tubes

by William Rose

Most of the materials used to make collapsible tubes are still highly critical, although there has been a recent relaxation with respect to aluminum. The "tube-for-tube" exchange plan was revoked early in 1944, not because metals were getting more plentiful, nor because the results were not important, but because the amount of tin obtained was rapidly approaching zero, since tubes manufactured for the past two years have contained less and less tin. Products permitted to use tubes continue to be few, as the necessity for strict conservation of tin still holds, and probably will for some time to come.

Plastics for caps and facilities for molding them have become scarce. Certain pigments used in decorating tubes, cork for cap liners, lacquers, paper boxes and shipping cases, and other materials and requirements are all more or less restricted and rationed. This situation is, of course, not unique and is familiar, but the necessary changes in materials and techniques are important as they have a bearing on the future.

In accordance with some estimates of requirements, aluminum will not be available for tubes for a long time. For various reasons, tin is the most suitable metal for packaging many products and, in the past, by far the largest proportion of tubes used has been made of this metal. The shortage of tin has made it necessary to substitute lead therefore and lead tubes, with suitable synthetic linings, have almost entirely replaced tin tubes.

The restrictions against the use of lead for certain products have been strictly adhered to by the Food and Drug Administration. The volume uses of tubes, however, have been for packaging toilet preparations.

The tube industry has for years had a substitute for tin tubes, used to some extent in this country and to a much greater extent in Europe, in the tin-coated lead tube, known also as "tin-plated," "tin-lined," "laminated" and "composite" to avoid calling attention to the fact that lead is the basic metal. More recently, tubes made of a tin-lead alloy have been used and these two substitutes, each of which provides a saving of about 70 per cent of the metal used in all-tin tubes, are the only metallic substitutes developed commercially which have proved to be satisfactory.

Many tubes using plastics, paper, or other basic materials have been invented, in the hope of finding one that can compete with the demonstrated qualities and economic advantages of metal tubes. Tubes of tin-coated lead or tin-lead alloy, if the nature of the packaged product should require it, can be coated internally with inert materials to prevent chemical or electrolytic reaction between container and contents.

The approach to the use of substitute materials for tubes should be by way of exhaustive tests with the actual products to be packaged, particularly when essential oils are included in the formula. The responsibility for such tests should rest with the manufacturer of the product. His own self-interest should dictate the selection of both the particular metal and lining material, if any, best suited to his product.

The metal-substitute tubes are made according to the

1. Small tubes for opthalmic salves or single doses of headache powders. Photo New England Collapsible Tube Co. 2. Collapsible tubes are obtainable in a number of sizes and varied designs. Illustration shows tubes prior to filling and sealing. Photo Victor Metal Products Corp.

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standards of the Collapsible Tube Manufacturers Association for standard tin tubes which have been in effect for many years. Decoration (labeling) is the same as heretofore, although shortages of the imported oils used in coating materials may affect their quality. To some extent, the use of metal caps may be dictated by necessity but, in all essentials, substitute tubes will retain the advantages of this type of container.

Classifications of tubes

Collapsible tubes may be classified in five general types, depending on the materials composing them.

1. ***Pure tin tubes***—Made of new virgin tin, alloyed with a small amount of copper or other suitable stiffener, in minute quantities. No adulterant, such as lead or other soft metals, is used in these tubes and they are essentially for use for any product going on or in the human body. Included among these products were toothpastes, shaving creams, cosmetic creams, depilatories, contraceptives, ointments, food products, hand soaps, and pharmaceuticals.

2. ***Lead tubes (lead-alloy tubes)***—Made of lead alloyed with antimony or tin. They have been used almost entirely for non-personal products such as adhesives, shoe polishes, paints, colors, and grease.

3. ***Aluminum tubes***—Made of pure aluminum, formerly replaced tin tubes to the extent of about 10 per cent of the total consumption. Because of the great chemical activity of aluminum, use of it was restricted to chemically neutral products until suitable vinyl compounds were developed for use as internal coatings.

4. ***Tin-coated lead tubes***—Lead-tube structures coated with thin layers of tin, inside or outside or both, which present much the same appearance as tin and are less expensive. However, they have not been generally accepted as fulfilling the standards of quality set by manufacturers or by the public. In some cases, the combination of the two metals in the presence of an electrolyte—an alkaline product, for example—has resulted in electrolytic action detrimental to both product and container. Internal coatings have been perfected which have largely overcome this objection and, for the period of the emergency, tin-coated tubes have been approved for the packaging of shaving creams. This approval may be extended to other types of products.

5. ***Tin-lead alloy tubes***—A recent development for which some advantages over tin-coated lead are claimed. The principal difference is the avoidance of electrolysis. Tubes of this type may be internally coated, as in the case of aluminum, and tin-coated, with equally good results. They are somewhat more costly than lead tubes, but compare favorably in price with other types.

3. Collapsible tubes, whether of tin or substitute materials, may be coated inside with wax or thermoplastic linings to protect contents. Photo Wheeling Stamping Co.



Tube specifications

There is no great trick in drawing tube specifications. The dimensions are determined by the amount of product it is desired to pack or by the size of tubes used in similar price lines by established competing products. The size of the neck opening is, in large measure, determined by the plasticity of the product and the quantity ordinarily used in one application. Thus, "brushless" shaving creams are packed in tubes with large openings, ophthalmic ointments in tubes with pinhole tips.

Specifications for tubes require the following data:

Dimensions:	Diameter at the shoulder; length from shoulder to open end. Size of neck or diameter of neck opening. Wall thickness at shoulder.
Cap:	Material and type of cap; type of liner.
Decoration:	Shoulder embossing, if any; coating and number of colors in printed matter.
Metal:	Tin, tin-coated lead, lead or aluminum.

Design and decoration

The cylindrical shape of collapsible tubes is dictated by the method of manufacture and the method of closing and sealing. Possibilities of variation in structural design are, therefore, nil. Design enters into the appearance of the cap and the embossed decoration on the shoulder, but it is on the "label" or side that design has fullest opportunity. While the fixed cylindrical shape imposes certain limits, these are the only limitations. Label designs may be of any character capable of reproduction by zinc etching, photogravure, or halftone. Decoration may be printed or embossed and printed in from one to four colors on a white or tinted coating. By the use of process plates, additional tints can be secured. The brilliant metallic surfaces can also be produced on tubes with a high degree of fidelity.

Coatings for collapsible tubes

by Robert J. Gray

The versatility of the collapsible tube as a container has brought it ever-widening use, and today, in the terms of the chemist, it must withstand products with a range of 3.5 to 11 pH. This means, in non-technical terms, resistance all the way from a good sour, acid vinegar right through to a harsh washing powder.

With such a wide range of acidity and alkalinity of products packaged in tubes, there is a tendency on the part of some to perforate or pit the metal of which the tubes are made, causing a growing demand for protective coatings. This demand existed even before the war, when there was no scarcity of metals from which to make tubes. With the wartime scarcity of tin, however, lead has become the common tube-making material, and protective coatings have assumed an even more important role, not only to prevent pitting, but also to prevent contamination by lead salts.

During the past two years researchers have been investigating this question of lead pick-up. Dr. David Menard's findings* indicate a significantly lower absorption of lead from wax-coated tubes. During the same period, the members of the Packaging Institute have carried out a great deal of as yet unpublished work which has led to the same conclusions. There is still much work to be done, because of the many factors which appear to affect the situation. For example, there are indications that underfill in tubes seems to influence lead pick-up considerably, with underfilled tubes showing a 300 to 600 per cent increase in pick-up over the filled tubes.

Types of protective coating materials

There are two main types of coating materials—thermoplastic coatings and lacquers. Each has its field, although the thermoplastic coating appears to offer greater resistance to contamination over a much broader range of products. Lacquers, in general, are hard to apply and to dry. They require special equipment for application, as well as the evaporation of the solvents used. They have a tendency toward pinholes, due to their variable nature, and their anchorage to the tube body is not too satisfactory. In general, also, lacquers have poorer resistance at the higher pH values.

Wax-type thermoplastics are more widely used than lacquers, and they are far easier to apply. Good equipment—such as the Peerless and Hiller tube-coating machines—in general use among the trade, is available at present. The performance of wax-type coatings naturally depends upon the material used, since a marked difference exists between the films formed by ordinary waxes, by blends of waxes and by the new thermoplastic coatings. This difference must be remembered when considering wax-type coatings.

Ordinarily simple waxes or blends of waxes may fail to give complete protection of the tube, for reasons of lack of continuity of the film, tendency toward development of pinholes and possible crystal formation. From an operating point of view, the viscosity of waxes or blends of wax is ordinarily so low at the application temperature that it is difficult to produce a film of sufficient thickness to give the best protection. In addition, adhesion of many of these films to the tubewall is low.

Thermoplastic coating materials, on the other hand, are characterized by cohesiveness and continuity of film. They are solutions of selected blends of waxes with high-polymeric, non-waxy materials of complex molecular structure which inhibit crystal growth and favor continuity and impermeability of the film. These thermoplastic coatings produce good adhesion to the metal tube and are flexible. They are also characterized by a hard surface which resists the abrasion of the filling operation. From an operating point of view, they are homogeneous products which do not separate or throw out in the melt tank, and their controlled viscosity over a wide temperature range gives coatings of uniform thickness.

Application of coatings

These thermoplastic coatings are applied by flushing the inside of the tube as a final operation of manufacture. The tubes, either singly or in pairs, are placed over a vertical mandrel having an actuating pin in the top. After being flushed by pressing the tubes down on the pins, a conveyor belt then carries them through a heated oven of about 200 deg. F. (or a temperature sufficiently above the melting point of the coating material so that the excess drains off), leaving a thin, uniform film. The drainage time is approximately 45 seconds. The wax tubes are then inverted and packed into containers.

Thickness of coating

Opinion as to thickness of coating desirable varies quite widely. It is certainly true that the thicker the coating, the less the diffusion of lead, all other things being equal. There are other factors to be considered, however—the tendency of heavier coats to crack and formation of a heavy lip of coating at the base of the tube which interferes with the sealing and crimping operation.

The future

At the present moment, thermoplastic coatings are doing much to reduce the variability in performance of today's collapsible tubes. While the use of coating materials had assumed a major role during wartime because of the lack of metal available for tube-making, there will always be a wide market for coated tubes.

* Published in the *Journal of the American Pharmaceutical Association* (Scientific Edition, Vol. XXXII, No. 8, August, 1943).



Advance!

ON the world's far-flung battle fronts, our fighting men are carrying out that stirring command—"Advance!" Their courageous deeds are writing a glorious page in history. And helping them to write that history—to keep strong in body—to combat sickness and disease—are collapsible tubes.

These small tubes whose peacetime duties have been devoted largely to such products as tooth paste, shaving cream and powders are now doing scores of vital jobs for our armed forces. Collapsible tubes hold emergency rations . . . sulfa drugs . . . pyrotechnics and other wartime products. To provide them Sun Tube is busily at work.

In addition, Sun Tubes are being used more and more for domestic products. Sun Tubes are sturdy and durable, perfect protection against dirt and germs. They are the ideal containers for dozens of everyday products.

If your product needs a container such as Sun Tube offers, we'll be glad to give you details. Just call or write our nearest office.

SUN TUBE CORPORATION · · · Hillside, New Jersey

CHICAGO, ILL.
James L. Canfield, Jr.
360 No. Michigan Avenue

ST. LOUIS, MO.
M. P. Yates
315 Chestnut St. (Room 125)

ST. PAUL, MINN.
Alexander Seymour
903 Pioneer Bldg.

LOS ANGELES, CALIF.
R. G. F. Byington
1260 North Western Ave.

XUM

TODAY'S PLANS
Build the Business of Tomorrow!



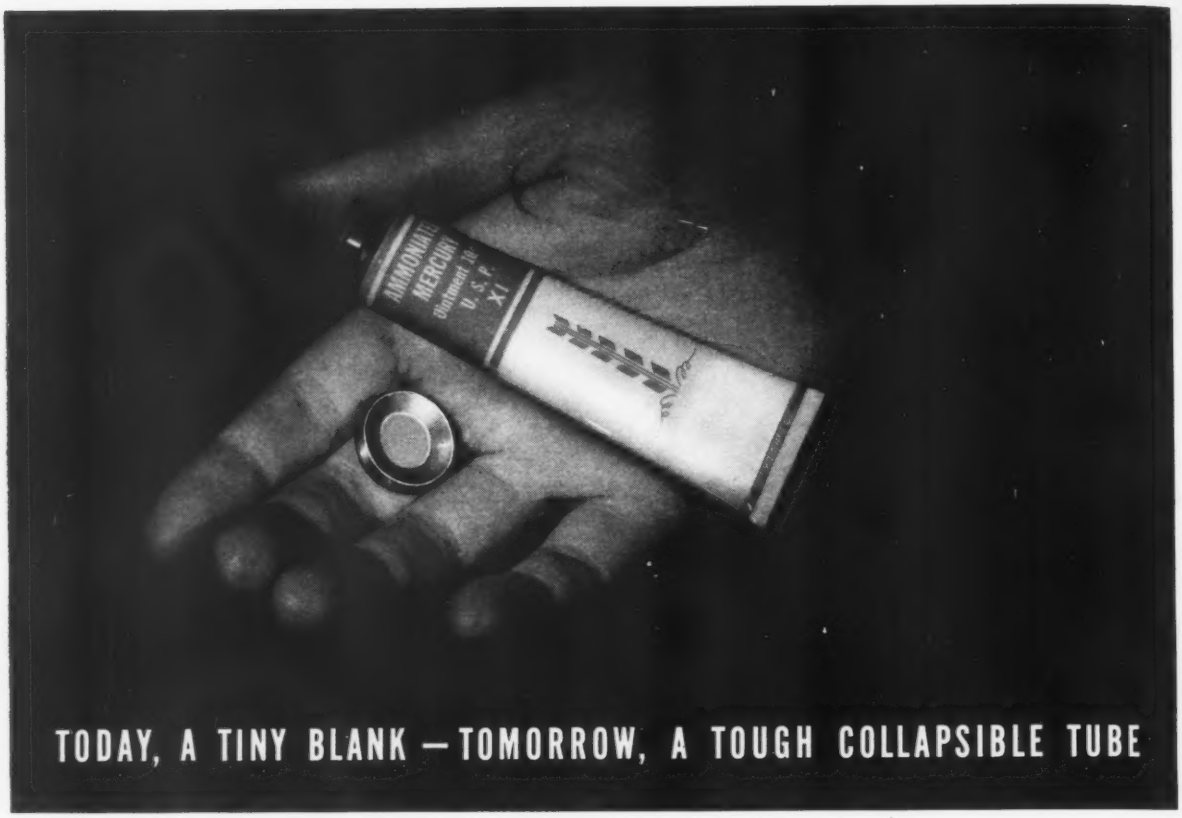
Carefully-laid plans are the secret of the success of any future business! Today, we of the Sefton Fibre Can Co. are laying the foundation for the business of tomorrow by foresighted planning. Our designers are revealing their creative genuis in striking, futuristic designs for you! Our executives have devised new ways of dramatizing your products in Sefton cans! It's all part of our well-organized plans for YOUR business of tomorrow!

SEFTON FIBRE CAN COMPANY

Plants — St. Louis, Missouri • New Orleans, Louisiana

DISTRICT OFFICES: Los Angeles, San Francisco, Denver, Tampa, Chicago, Des Moines, New Orleans, Boston, Detroit, Kansas City, St. Paul, Omaha, New York, Cincinnati, Cleveland, Oklahoma City, Pittsburgh, Memphis, Nashville, Dallas, Houston, Salt Lake City, Seattle

XUM



TODAY, A TINY BLANK — TOMORROW, A TOUGH COLLAPSIBLE TUBE

THEY'RE *tough*, these New England Tubes . . that's why so many medical ointments are packed in them for General Issue to our troops in the field; for the nurses and the doctors that serve our men. There's no time to take chances on weak, broken tubes. Strong, flexible Sheffalloy Tubes are being shipped in convoys to all parts of the world to function in climates from the below-zero temperature of the arctic, to the merciless humid sunshine of the tropics.

Sheffalloy TRADE MARK REGISTERED TUBES
SHEFFIELD PROCESS

Vinicote TRADE MARK
INTERIOR COATINGS

There are over 50 different Interior Coatings in the complete VINICOTE Series . . all specially developed by our own research staff. Regardless of the chemical properties of the product, there's a VINICOTE Inner Coating that will protect it from corrosion and creep, render it inert to metallic reaction. Please anticipate your needs far in advance.

NEW ENGLAND COLLAPSIBLE TUBE CO.

3132 S. CANAL STREET, CHICAGO 16 • NEW LONDON, CONN. • W. K. SHEFFIELD, 500 FIFTH AVENUE, NEW YORK 18
THE WILCO COMPANY, 6800 McKINLEY AVE., LOS ANGELES 1

XUM

The amazing can... THAT BLOWS UP A BALLOON THAT CARRIES UP AN AERIAL THAT RADIOS AN SOS!

Fantastic, you say? Yes—but true!

This can is used in a new type life raft for bomber crews. In the top of the can is a hole. Into this is screwed a hose attached to a small balloon. Inside the can is *another can*, which slides part way out like a telescope.

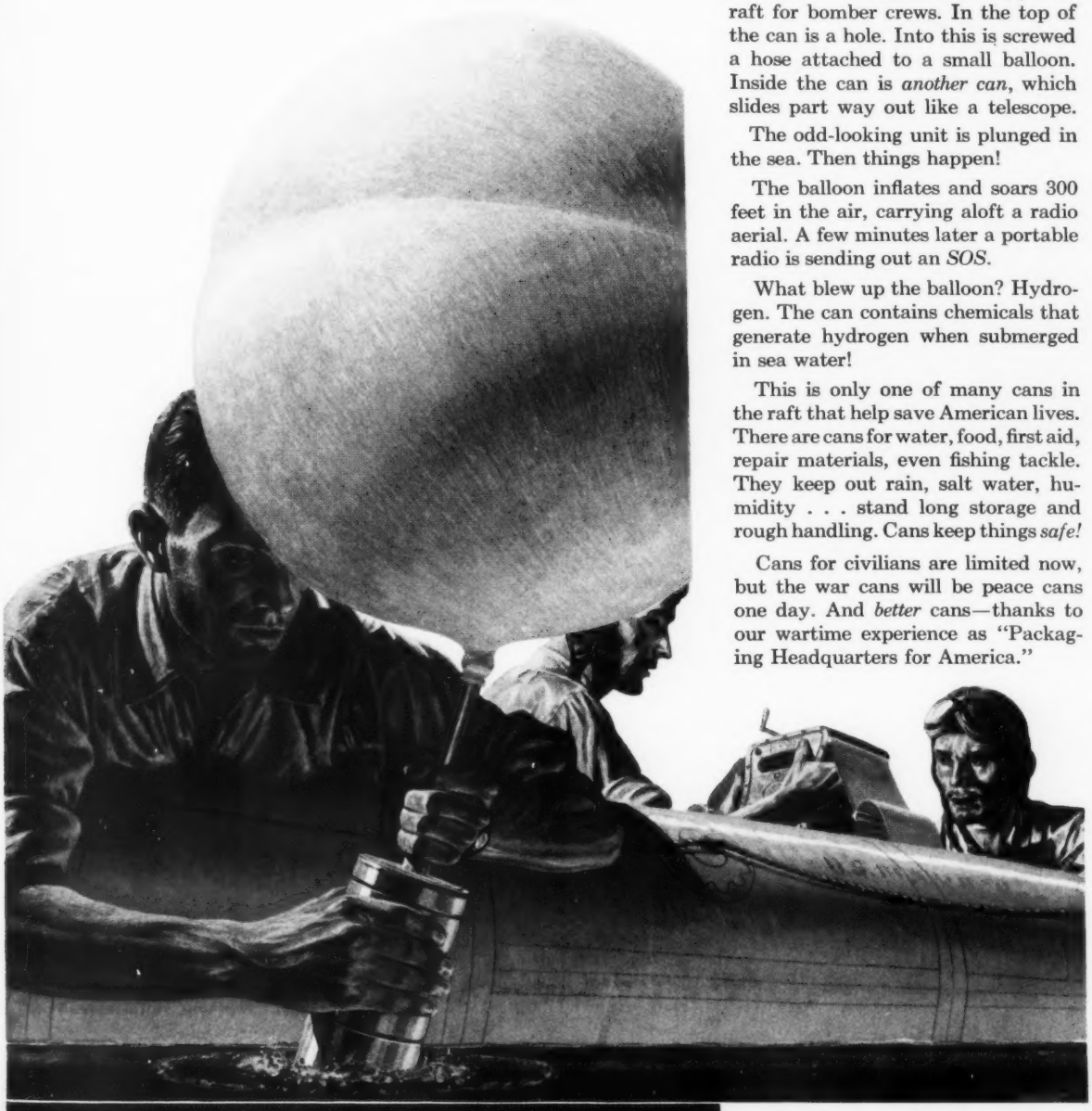
The odd-looking unit is plunged in the sea. Then things happen!

The balloon inflates and soars 300 feet in the air, carrying aloft a radio aerial. A few minutes later a portable radio is sending out an *SOS*.

What blew up the balloon? Hydrogen. The can contains chemicals that generate hydrogen when submerged in sea water!

This is only one of many cans in the raft that help save American lives. There are cans for water, food, first aid, repair materials, even fishing tackle. They keep out rain, salt water, humidity . . . stand long storage and rough handling. Cans keep things *safe!*

Cans for civilians are limited now, but the war cans will be peace cans one day. And *better* cans—thanks to our wartime experience as "Packaging Headquarters for America."





CONTINENTAL CAN COMPANY

100 East 42 St., New York City

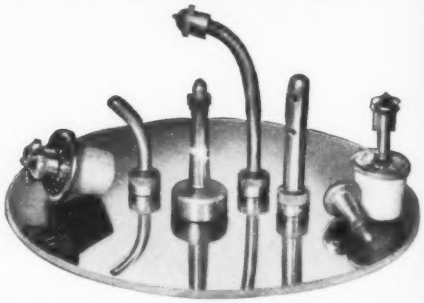
HELP CAN THE AXIS—BUY WAR BONDS

XUM

XUM

WIRZ TUBES *dispense without waste* ★ ★

More than containers that protect your product during its trip to market, WIRZ Tubes are convenient, sanitary, WASTELESS Self-Dispensers. They conserve your product and your good name. Well made to WPB's Order M-115 to conserve metals for VICTORY. Suitable linings and closures. Economical in weight and freight. Service orders first, of course.



APPLICATOR PIPES • HOUSEHOLD CAN SPOUTS

COLLAPSIBLE METAL TUBES • LACQUER LININGS • WAX LININGS • WESTITE CLOSURES • METAL SPRINKLER TOPS • COMPRESSION MOLDING

Established 1836

•A•H•WIRZ•INC•

• COLLAPSIBLE TUBES • SPRINKLER TOPS •

★

CHESTER
PENNSYLVANIA



EXPORT DIVISION: 751 DREXEL BUILDING, PHILADELPHIA, PENNA.

•OFFICES

NEW YORK, N. Y. 30 E. 42nd St.
CHICAGO, ILL. 80 E. Jackson Blvd.
MEMPHIS, TENN. Wurzburg Bros.
HAVANA, CUBA Roberto Ortiz Planos

A. G. SPILKER:
LOS ANGELES, CALIF., 1709 W. 8th Street (EXposition 0178) — Also DANVILLE, CALIF.

XUM

XUM

CROWN
is in this picture TWICE



No, none of the more familiar Crown products of peacetime are on view!

But the canisters that hold the filter elements for those gas masks are a Crown wartime product . . . produced by the million in the Crown plant to safeguard military, naval and civilian users.

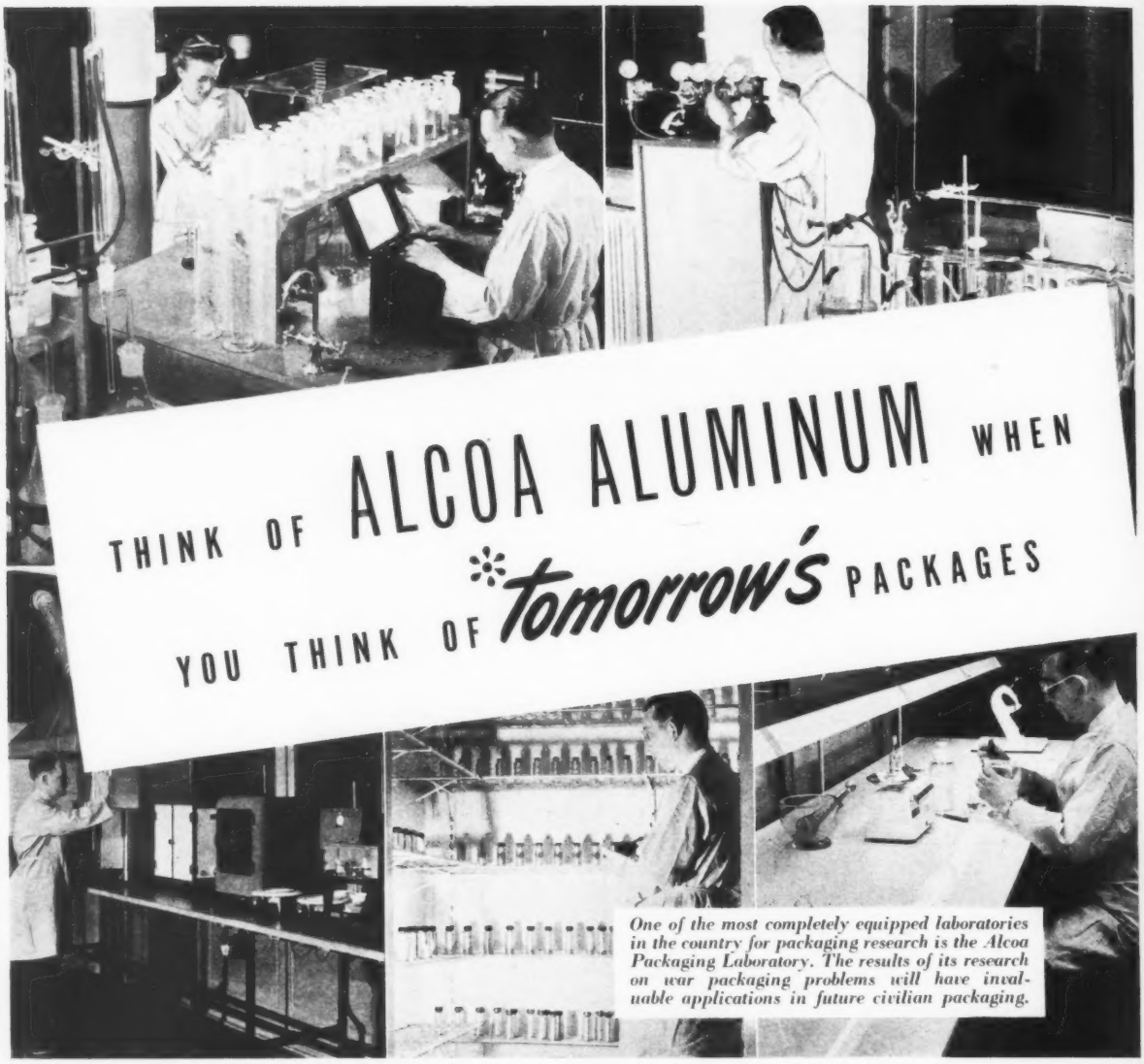
And those waterproof metal ammunition boxes are another Crown product . . . another example of the way all of Crown's facilities have been enlisted in the service of a nation at war!

Meanwhile . . . the less dramatic but no less necessary products . . . cans in which to pack food for fighting men and for the home front . . . cans for the essential products which can not be successfully packed in other ways . . . continue to roll from Crown's production lines! Crown is doing double duty these days!

CROWN CAN COMPANY, New York · Philadelphia. *Division of Crown Cork and Seal Company,* Baltimore, Md.

★ ★ ★ ★ ★ CROWN CAN

XUM



THINK OF ALCOA ALUMINUM WHEN YOU THINK OF *tomorrow's PACKAGES

One of the most completely equipped laboratories in the country for packaging research is the Alcoa Packaging Laboratory. The results of its research on war packaging problems will have invaluable applications in future civilian packaging.

With one important exception, you can forget most of what you have known or believed to be true about packaging in Alcoa Aluminum. When the potrooms that have been pouring aluminum for war start pouring it for peace, there will be a whole new set of facts for you to weigh.

There will be more Alcoa Aluminum than ever to use. What its price will be, particularly in fabricated forms, is anybody's guess. It *should* be interesting.

Then there are new technological developments. New Alcoa Aluminum Alloys have been perfected. New packaging techniques and constructions have been developed in the Alcoa Packaging Laboratory.

The fact to remember, the one that will not change, is this: Aluminum is a natural protector. That's the main reason why it has been used so widely in the past, and will be used more widely "tomorrow", for packaging. It is friendly to food, a defender of freshness, an enemy of the things which cause spoilage.

If your product, however it is packed, needs protection from air or light or moisture (gain or loss), if its freshness, aroma, flavor, volume or color are subject to change, think of Alcoa Aluminum for tomorrow's packages.

**Tomorrow—the day when aluminum is again available for civilian packages. Watch for news of its arrival. It may come sooner than you think.*

TO HELP YOU STEER YOUR THINKING:

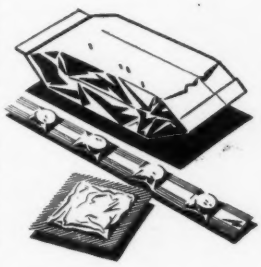
Could you use WRAPPERS or LINERS?



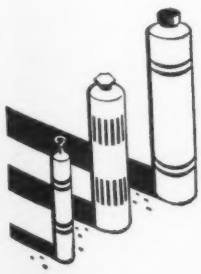
By surrounding your product with Alcoa Aluminum Foil you give it multiple protection . . . protection against air, moisture, vapor, light, radiant heat, and insects. It may be used as a wrapper or a liner. The closer you keep the foil to the product, the greater the protection; but even as an outer wrap, it is highly efficient and you then get the advantage of its eye-appealing sparkle.

Could you use BAGS or PACKETS?

Heat-sealed Alcoa Aluminum Foil was making great strides before the war, and war uses have confirmed its superiority. The foil is laminated to, or coated with, a plastic or adhesive to form airtight, moistureproof and vaporproof seals at all openings and seams. The resultant bag, packet, pouch or tape is the ideal container for hygroscopic products or for products whose contained moisture must be preserved.



Could you use COLLAPSIBLE TUBES?



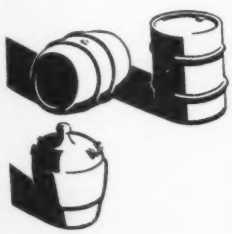
The low cost of Alcoa Aluminum Tubes will be a big attraction. Their extra strength and lower shipping cost (because of lightness) will be others. These advantages can be enjoyed by virtually any product that can employ tubes. If your formula doesn't get along with plain aluminum, the Alcoa Packaging Laboratory can prescribe the proper interior coating for use with your product.

Could you use ALUMINUM CLOSURES?

Tricks can be done with Alcoa Aluminum, in the design and functioning of closures, that can't be done well in other materials. Seals can be made absolutely tamperproof; can be tailor-fitted to each container to assure a more secure seal; can be designed to fill special needs which standard closures do not meet. Furthermore, aluminum closures do not rust. Beautifully decorated, they dress up your package.



Could you use ALUMINUM CONTAINERS?



If you use barrels, drums, or carboys for bulk shipping, think of the weight you can save with aluminum. The sturdy strength of Alcoa Aluminum Alloys will endure rough handling and many return trips.

If you use smaller containers, such as bottles, cans or boxes, Alcoa Aluminum offers interesting prospects in that direction, too.

Could you use some IMAGINEERING?

It usually turns out best when made a joint enterprise . . . this Imagineering. You know its object . . . to pull out of your imagination and pin on a drawing board the plans for a new or better product. If you have an inspiration about using aluminum for a package and would like some practical, proficient, how-to-do-it help, we will gladly cooperate. We may even have some suggestions of our own to offer you. ALUMINUM COMPANY OF AMERICA, 2150 Gulf Building, Pittsburgh, Pennsylvania.



ALCOA ALUMINUM

XUM



CYLINDRICAL PAPER CONTAINERS FOR MOIST AND SEMI-LIQUID FOODS.



SINGLE SERVICE PAPER BOTTLES FOR MILK AND STILL DRINKS. BOTTLE CAN BE USED AS SHAKER WITH SPECIAL COVER CAP.



SEALRIGHT CONTAINERS WITH SPECIAL LINERS PROVE EXCELLENT PACKAGES FOR A VARIETY OF FOOD PRODUCTS.

IN FOOD PACKAGING Sealright IS A GREAT NAME!

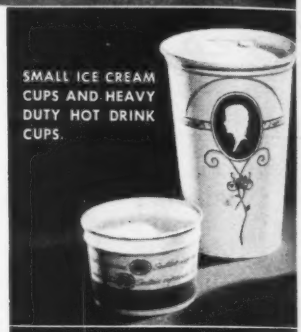
The accompanying illustrations suggest the wide range of service rendered to the dairy, ice cream and food industries by Sealright Sanitary Paper container. These containers are as distinctive and serviceable as they are varied. Sealright is a great name to remember when you have a food product to package.

THE SEALRIGHT CO., INC., FULTON, N. Y.
KANSAS CITY, KANSAS
SEALRIGHT PACIFIC, LTD., LOS ANGELES

We use +SEALRIGHT+ SANITARY SERVICE for Your Protection

This nationally advertised trademark imprinted on all Sealright containers is recognized by consumers as the symbol of quality and cleanliness.

SANITARY PAPER CONTAINERS AND CLOSURES



SMALL ICE CREAM CUPS AND HEAVY DUTY HOT DRINK CUPS.



CONTAINER LIDS MAY BE ADAPTED AS GLASS JAR CLOSURES.



SANITARY CLOSURES AND COVER CAPS KEEP MILK BOTTLE TOPS CLEAN.

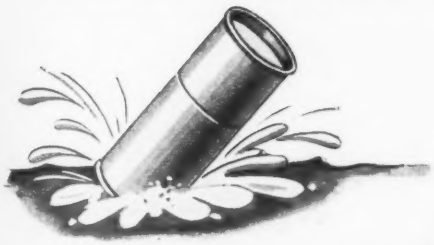


SINGLE SERVICE BULK PAPER CONTAINERS DELIVER ICE CREAM TO FOUNTAINS. OTHER TYPES USED FOR FROZEN FOODS.

XUM

Specialized Containers for Difficult Packaging Problems

SPLASH-PROOF



● Developed for the U. S. Navy. In peace-time use, will protect contents from outside moisture in bathrooms, kitchens, etc.

● Container problems that call for ingenuity and imagination are our meat. We'd rather tackle the hard job than the run-of-mine.

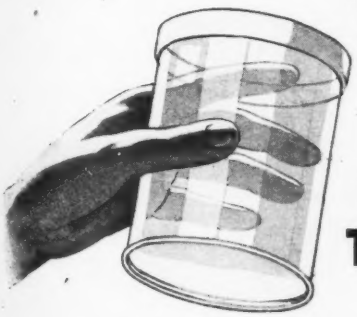
Such, for example, as the unusual fibre board splash-proof and water-tight containers we're making for the Army and Navy. "Hush-hush" now, but sure of wide post-war commercial use.

Their light weight will save you money in the coming age of air freight. Other advantages may specifically fit your individual problem.



MOISTURE-VAPOR PROOF

● Prevents passage of moisture-vapor, and solvents, either inwardly or outwardly.



SEE-THRU

● "They buy what they see" is good merchandising logic. We pioneered cellulose-acetate containers—continue to lead in original package design and decoration.

WATER-PROOF



● Actually resists water penetration. Package can be submerged without damage to contents.

DU PONT Cellophane

Clark Splash-Proof, Moisture-Vapor Proof, and Water-Proof containers were developed and perfected in close co-operation with the Technical Divisions of a number of sources of basic packaging materials. They have stood the test.

FOR TECHNICAL INFORMATION ABOUT THESE PRODUCTS WRITE

Geo. V. Clark Co., Inc.

42-26 THIRTEENTH STREET
LONG ISLAND CITY 1
NEW YORK

XUM

★ ★

OUR CUSTOMERS

Your patience with us during the past two years is appreciated beyond words

but

we will never be happy until

R. C. SERVICE

is again living up to your expectations.

R. C. CAN COMPANY

SAINT LOUIS **MISSOURI**

RITTMAN, OHIO • KANSAS CITY, MO. • ARLINGTON, TEXAS

Sales Offices

ATLANTA	LOS ANGELES	MILWAUKEE	NEW YORK
ARLINGTON, TEX.	LOUISVILLE	MINNEAPOLIS	PITTSBURGH
KANSAS CITY	MEMPHIS	NEW ORLEANS	RITTMAN, O.
DENVER	NASHVILLE	ST. LOUIS	

XUM

XUM

Art Tubes . . . .



● **COLLAPSIBLE METAL TUBES**

Made right from start to finish in our own plant—from the actual pig of metal to the completely decorated tube—under the capable management and supervision of craftsmen whose experience and knowledge extends through two generations.

● HOUSEHOLD CAN SPOUTS ● SPRINKLER TOPS ● CYLINDERS
● PIONEERS IN THE FABRICATION OF TINLINED TUBES

ART TUBE COMPANY
500 Lyons Ave.
Irvington, 11, New Jersey
TELEPHONE WA. 3-6400

TIN • TINLINED • LEAD • ALUMINUM • WAXLINED

ART TUBES MAKE A GOOD PRODUCT LOOK BETTER!

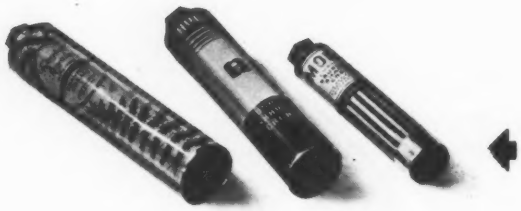
XUM



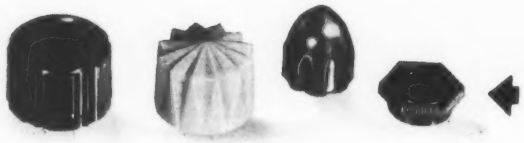
ALUMINUM VIALS

• Aluminum vials are important packages to consider in choosing your containers for drugs, pills, capsules, cosmetics.

Aluminum vials offer many advantages. They are lightweight—approximately 85% lighter than glass containers with similar capacity. They may be lithographed directly to the metal. We produce a complete range of aluminum vials, providing special liners and interior coatings where necessary.



Aluminum collapsible tubes find many end uses permissive under government orders.



Decorative, colorful plastic caps molded in standard sizes. Custom shapes and designs also available.

VICTOR

METAL PRODUCTS CORPORATION

196 DIAMOND STREET BROOKLYN 22, N. Y.

VICTOR

XUM

WE ARE PROUD OF OUR *Customers*



THE FACT that so many leading products are packaged in Peerless Tubes is an indication of what they may do for you. Whether you're launching a new item, or re-packing one already established, there's a Peerless tube in the proper material for the job.

Follow the leaders to Peerless Tubes. Write for samples.

PEERLESS TUBE COMPANY • Bloomfield, New Jersey

CHICAGO	CINCINNATI	MINNEAPOLIS	LOS ANGELES
Rose Label & Box Co.	J. E. McLaughlin	W. R. Malecker	W. I. Frost
123 Madison St.	401 Lock St.	Northwestern Bank Bldg.	4992-½B Melrose Ave.

XUM

XUM



ROUND PAPER PACKAGES

& Package Parts for many Industries

The paper tubes, cans and drums; the plastic closures and the metal end containers shown on these pages are helping many industries to continue their packaging operations under difficult war conditions.

Using a minimum of critical materials, and in many cases none at all, these packages provide protection, easy dispensing and attractive surface decoration for the widest variety of products.

Cleveland fibre drums have special coatings to hold greases, paints, heavy oils, etc. They are made in a wide variety of weights and sizes to give the utmost in shipping protection and to stand up under continued hard use.

Plastic articles such as coasters, small wheels are used by toy manufacturers to replace metal and wood. Closures for small containers replace metal. These plastics are low in cost and do not consume any strategic material.





XUM





Our metal-end packages have always been known for their unusual strength. Where permissive, they make fine containers for the packaging of dry products in the food, drug and chemical fields.

All-paper containers are most practical for dispensing dentrifices and talcum powders. They are packages that are expected to retain their place in the market after the termination of war. Where economy is the main consideration, these all-paper cans with drawn paper ends meet minimum requirements of eye-appeal and protection.

Also: printed tubes (small diameter) used as vial containers; condenser tubes in the radio field; tubes printed to specifications for many other purposes.

None of these containers is strictly a war baby. All have wide post-war possibilities. We will be glad to help any manufacturer plan for the use of the proper round container and closure for his reconversion to peacetime production.

The CLEVELAND CONTAINER Company

10630 BEREA ROAD — CLEVELAND, OHIO

Other Plants:

NEW YORK CITY
DETROIT — LONG ISLAND CITY
CHICAGO — MILLTOWN, N. J.
PLYMOUTH, WISC. — PHILADELPHIA
OGDENSBURG, N. Y. — PALMER, MASS.

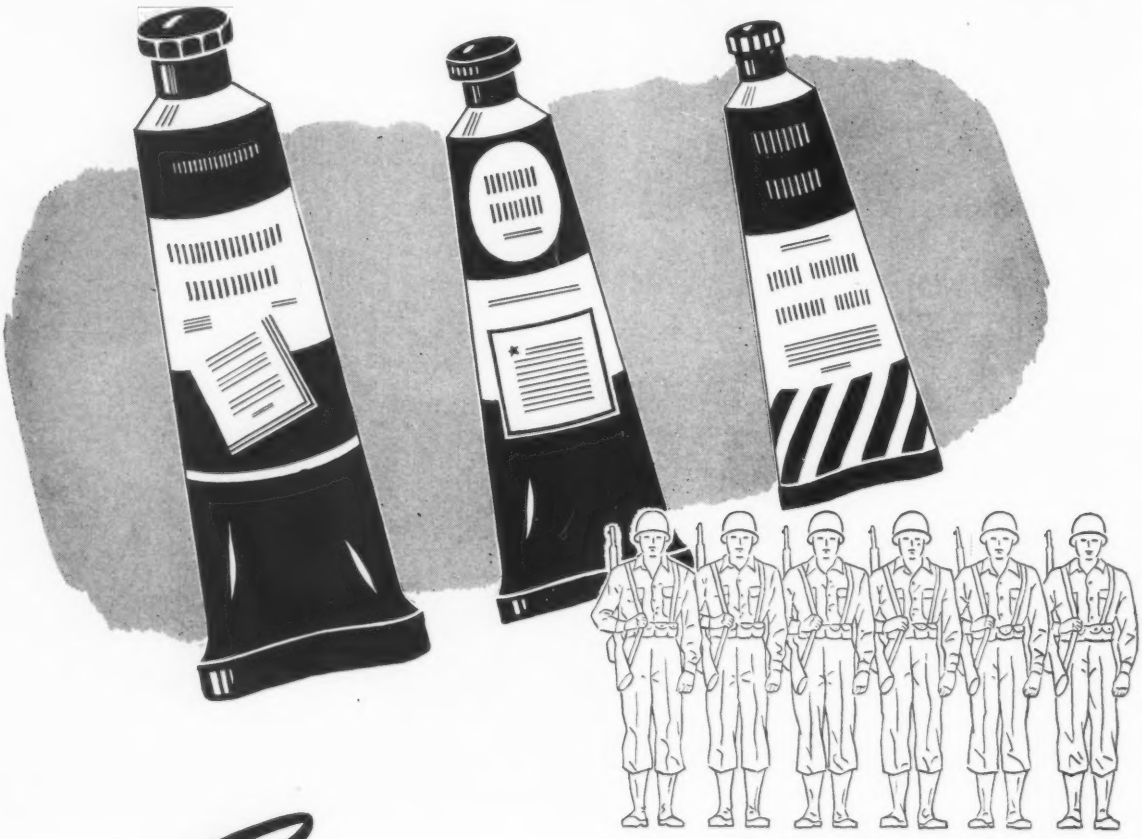
All Units Operating 50% to 100% in War Production

Divisions and Subsidiaries:

PLYMOUTH ENGINEERING
PLYMOUTH PLASTICS
ABRASIVE DIVISION (NO-LAP)
WILLARD PASTE & GLUE CO.

XUM

NATIONAL COLLAPSIBLE TUBES



Endurance for the Duration

For strength, assurance and uniform high quality in easy dispensing of creams, pastes and liquids there has been no adequate substitute for the metal collapsible tube.

Confined as we are to the use of metals baser than formerly used; we now coat the inside of National Collapsible Tubes, when required, with protective linings, and which after testing we find are of the best.

When Victory is achieved, all our tubes will be available to all manufacturers once more.

NATIONAL COLLAPSIBLE TUBE CO.

Chicago ★ 362 Carpenter Street, PROVIDENCE, RHODE ISLAND ★ San Francisco

XUM



LABELS—SEALS—TAGS & MARKING PIECES

Development of Labeling 294

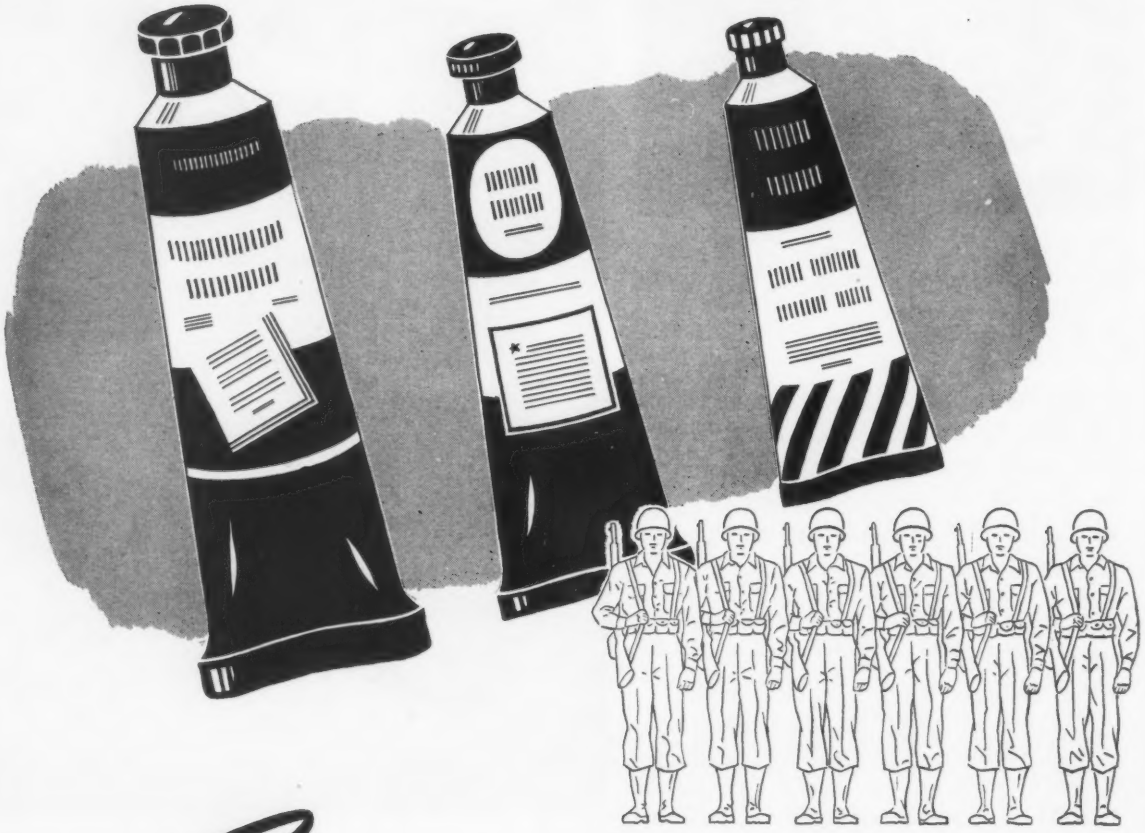
Label Materials and Processes 297

Label Statements—Required and Optional 302

Label Space as Advertising 310

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Chicago ★ 362 Carpenter Street, PROVIDENCE, RHODE ISLAND ★ San Francisco

XUM



LABELS—SEALS—TAGS—MARKING PIECES

Development of Labeling 294

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Label Space as Advertising 310



1

1. Canned foods, of all products, are most consistent users of labels which identify brands for benefit of both producer and consumer and carry required information.

Development of labeling

by Charles R. Cosby*

If the Greeks had a word for it, the Romans nevertheless had a label for it, at least to the extent of inventing and popularizing the word from which we derive the Anglicized form of "label." It remained for modern language to apply the word in a metaphoric sense to persons, meaning to place a person in a definite category, as if actually emblazoned in bold and unmistakable characters. For example, a person who is said to bear a party label is thereby classified and identified. Language and meaning have reached maturity when the words to describe the commonplace things like the markings of early pottery have become, through the centuries, appropriate to describe the qualities and distinguishing characteristics of human beings. It serves to clarify the true significance of the label when the narrow sense of the term has achieved a figurative but still exact definition.

It is now known that labeling was the primary step in the art of writing. The earliest practice of the use of markings for the purpose of conveying intelligence was found among the excavations of Sumerian habitations in Mesopotamia. The communal life of these people, who lived nearly 5,000 years ago, has been placed by scientific research near the end of the so-called Uruk period, somewhere between the years 3500 and 2900 B.C.

The origin of labeling

The markings practiced by the Sumerians consisted of seals or cylinders bearing the peculiar and distinctive mark of the owner. These marks were the first asser-

*Edited entire chapter on Labels—Seals—Tags—Marking Pieces.
NOTE: Most of the illustrations in this chapter indicate by code marks the label makers to whom credit is due for assistance in supplying appropriate illustrations. This code is explained on page 311.

tions of property rights—they were the evidence of ownership. Naturally they were placed on objects of value which, as they passed from one generation to another or from hand to hand in exchange for other objects of value, became marks of authenticity. Their value depended upon the honor and prestige of the mark.

As commerce and trade developed between nearby communities there was developed a medium of exchange or currency. The objects used for this purpose had an intrinsic value, expressed according to weight and fineness—a practice which established as currency familiar pieces of metal or like substances bearing weight designations and the mark of the weigher. The validity of the piece, plus the mark of the issuer, spoke for themselves. It was not necessary to provide a name for the currency, although in the course of time, things began to have names, represented by certain marks which eventually became letters of the alphabet.

Commerce and the exchange of commodities made it necessary for goods to have marks of origin. Methods of packing made it necessary for containers to have marks of contents. That system was adopted for trade among dealers as distinguished from consumers. Measured by the yardstick of time and history, the art of packaging for consumer distribution is of very recent origin. Packaging has been made possible by utilizing one of the oldest methods of communicating human intelligence, namely, the marking of goods to establish identity and authenticity.

Within the memory of persons now living, it was the general practice to dispense goods from bulk into containers furnished by the customer. Such products as prunes, sugar, crackers, candy and other foodstuffs were wholesaled in bulk to retail dealers, who scooped, weighed and sometimes packaged each customer's order as and when wanted. In those days, time was something which everybody had plenty of, the neighborhood store was a comfortable spot in which to kill time and swap gossip and nobody was bothered with new-fangled notions about efficiency. Nevertheless, the enterprising jobber's salesman was smart enough to discover that he could write bigger orders if he always sold some paper bags with each lot of bulk prunes and each keg of hard candy. Even the storekeeper found that his spare time could be used to tie up packages in anticipation of the next day's sales. He noticed that every commodity has a natural order-size for consumer use. Moreover, he learned that the customer never did like the unsanitary appearance of bulk goods. The retailer was quite willing to let the wholesaler and manufacturer take the packaging job off his hands.

In the meantime the country was becoming more thickly populated and the retail outlets were vastly increasing in number. People began to read newspapers. The packages bearing brand names, aided and abetted by the force of advertising, began to make their way into the corner and cross-roads stores. Better and faster transportation enabled people to move about more freely in the exercise of their privilege of buying where they might choose. This freedom of movement of goods

2. Beer labels must be produced in colors that resist action of refrigeration. 3. Labels for confectionery are made in a variety of forms. Nestle's Milk Chocolate is in an over-all wrap which serves to protect as well as identify, while box chocolates make free use of seals, die-cut and embossed, giving an air of distinction to the product. 4. Color and design for drug and cosmetic packages range from dignified reserve to the most flamboyant appeal.



and people increased the play of competition and the need to restore the frankness and forthrightness which characterized the simple commerce of our forebears.

When the contents disappeared behind container walls it became necessary for the package markings to assume some responsibility for the concealed contents, their source, quality and quantity. It was inevitable that some goods taken on faith without inspection should turn out to be something less than was expected. Many causes of dissatisfaction arose. The opportunities for fraud were numerous. At any rate, someone (the government) representing the public had to step in and say with authority: "Be honest and tell the whole truth regarding the contents of closed containers." Packaging and labeling thus arrived at their present state of mutual dependence and helpfulness. Thus the system of distribution evolved to the point where the label speaks for the qualities which the *uninformed* purchaser is expected to accept—label statements that cannot be verified by casual examination.

Correct labeling is a boon to the honest seller because it eliminates the deception and trickery of dishonest competitors, a course of dealing which tends to discredit all merchandising. The success of mass distribution and comfortable living must depend upon confidence.

Types of labeled items may be classified and subdivided into groups, although the border lines between classes are not clear and distinct. When does a package cease to be a package? One answer is, when the contents can be inspected without breaking the covering. However, "content" means something else in regard to a piece of fabric. The need for labeling begins at the point where the consumer is asked to take something on faith. Roughly, the classes of labeled articles are listed below.

Closed Containers

Closed containers, in which the contents are concealed (not inspectable):

Metal cans or glass jars are the most common containers for food products, especially fruits and vegetables, which are sterilized after being hermetically sealed. These containers must have sufficient strength to withstand the heat processing which is a part of the sterilization.

Cans and bottles are also popular for fruit and vegetable juices and for prepared soups.

Bottles and jars are used for drugs, medicines, cosmetics, perfumes, etc.

Fibre cans are used for many dry products which do not require heat treatment for sterilizing purposes.

Set-up boxes use tight wrappers which also serve the purpose of a label.

Cartons may be labeled directly, or by means of labels which are pasted on the cartons.

Bags and other convenient receptacles for loose articles have the label imprinted on the bag or attached to the bag.

Wrapped pieces such as bars of candy and soap require labeling.

Boxes and shipping cases used for fresh fruits and vegetables are labeled with end strips or bands, and frequently contain advertising material.

Hermetically sealed packages of new types are being developed for dehydrated foods.

Unwrapped articles

Unwrapped articles (inspectable) are labeled by attaching tags, tickets or marking pieces. In this category are:

Textiles and fabrics which are sold by the piece with labels attached

Garments and other apparel, sold with paper or woven labels.

Tools are usually labeled with decalcomania or paste-on labels.

Equipment, utensils and appliances of many types are labeled with decalcomania or attached labels.

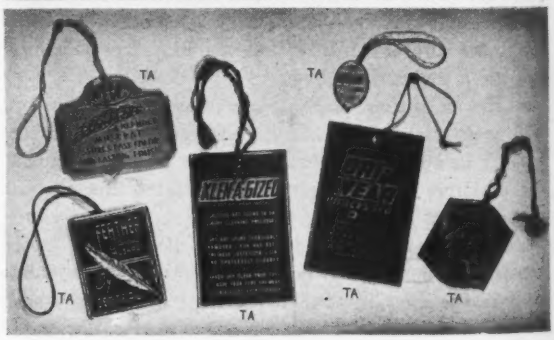
Folders or circulars which accompany articles at the time of sale are in the category of labels even though not attached to the articles. Even in cases where the circulars and the goods are shipped separately, the Supreme Court has held that the common origin and destination of both circular and product produces a situation which brings the circular within the definition of labeling. Both the Federal Trade Commission and the Food and Drug Administration have jurisdiction.

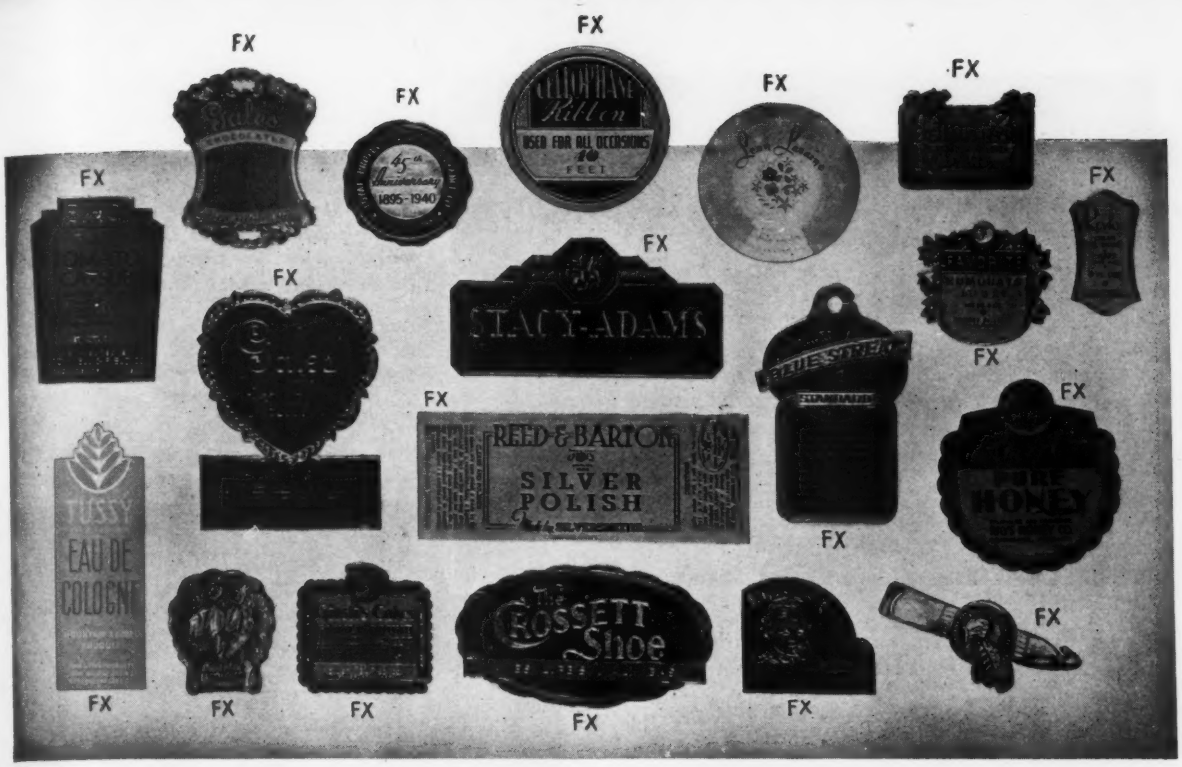
5. Telling what the consumer wants to know has been facilitated by means of labels that give information regarding sources and producers. 6. Tags or labels attached by means of string afford a method of labeling objects of unusual shape or character such as fur garments, and, in addition, give a touch of elegance to the product.

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1. Labels on metalized paper lend themselves readily to die-cut forms and embossed treatment. These labels may be applied directly to the product or to its container, serving to enhance the appearance and intangible value of the item.

Label materials & processes

Styles and varieties of labels are as numerous as the classes of objects to which the labels are attached. Paper is the favorite substance because its qualities can be readily adapted to various finishes and processes. Combinations of paper and metallic foils are capable of producing many interesting and artistic effects. Labels which use adhesives depend for their strength upon the rigidity of the surface to which they are affixed. Tagboards and other strong grades of paper are used where the method of attachment requires a substantial body.

Labels for canned foods are usually of the wrap-around type. The ends of the label overlap and are pasted together by the operation of the labeling machine. The labels are held in position on the cans by a few spots of glue, otherwise there is no adhesive between the label and the can. The reverse side of the label may be printed with recipes, if desired.

Labels for glass jars may be of the wrap-around type, but the adhesive problem may be different, especially for narrow band labels which lack strength and protection against lateral thrusts.

Closed containers

For the labels of cans, special grades of paper, suitable for the particular purpose are used. The stiffness of the paper has a certain relationship to the direction of the grain, as well as the size and shape of the label. Papers that are to be varnished, embossed or otherwise treated by the graphic arts processes are selected because of their suitability for the purpose. No single kind of paper is best. These technical details are usually decided by consultation with the manufacturers of the labels and the labeling equipment. There should be proper coördination between all the factors that determine the success of the labeling.

Varnishing adds brilliance and permanence to a label, protecting it from soiling and thus prolonging its effective life. Lacquering has a very definite place on certain types of labels. Spot varnishing is applied in the printing process.

Embossing is a form of bas-relief, one of the earliest methods of depicting the third dimension (perspective), and thus enhancing the artistic effect. One specialized form of embossing is called "pebbling." At comparative low cost this process adds an interesting texture to the entire surface of a label which, in a measure, compensates for the lack of foils and fancy papers.

Food products which are expected to have appetite appeal are usually designed with a pictorial representation of the food in natural colors. To this is frequently added a picture of a combination of foods prepared from a recipe. Color photography, combined with the

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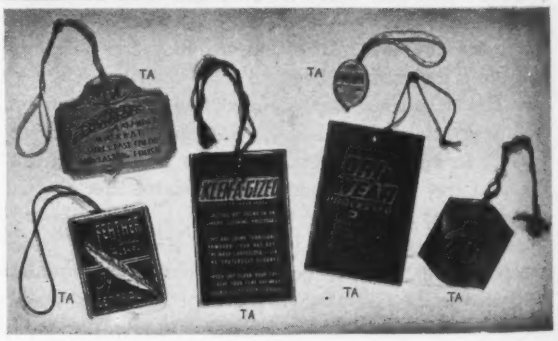
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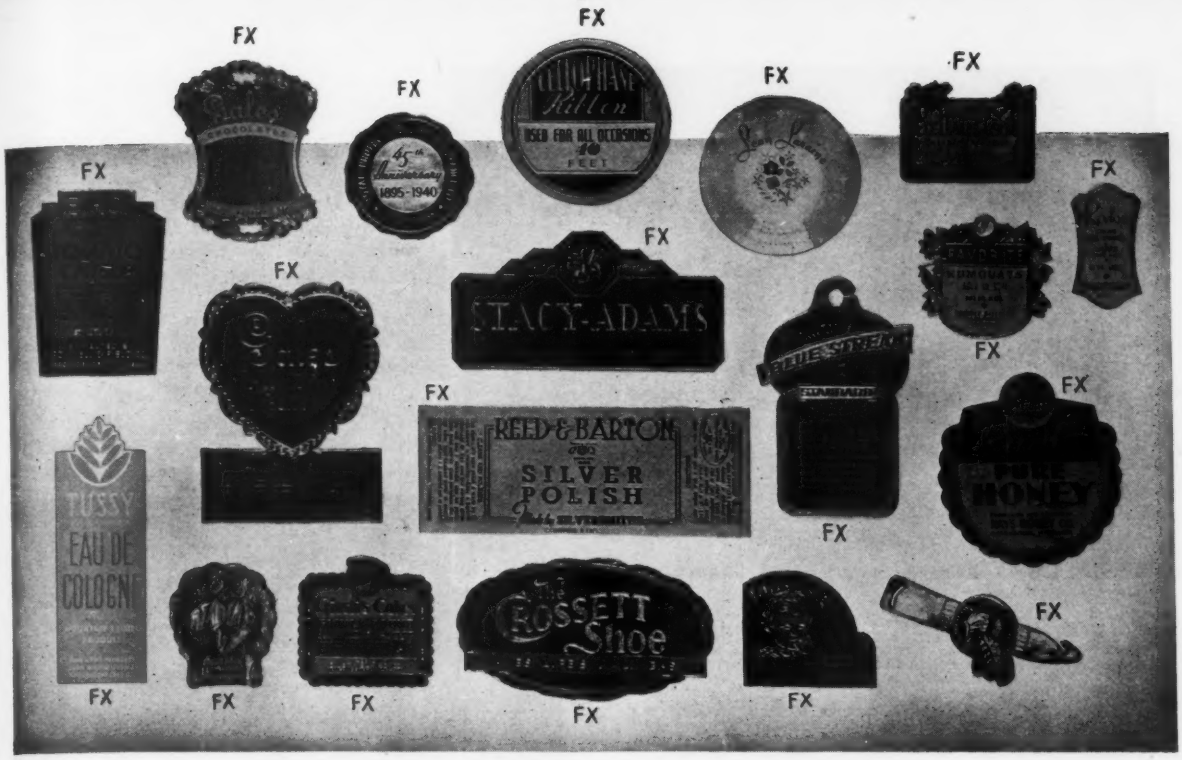
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2. End labels are being used more and more on bakery goods. They may serve as a seal for the wrapper, and, in addition, are a convenience for the consumer who may choose a favorite brand even though the goods are stacked on shelves with only the ends showing. 3. Decalcomania transfers make excellent labels for de luxe cosmetic packages. Here, applied to opal glass containers, they withstand long use.

3



graphic arts (4-color) processes, enables the artist to obtain effects which markedly increase the sales-appeal of the product.

Metallic inks and dusting powders, when available, are used to accentuate parts of the label design that are susceptible to such treatment.

Glass containers offer certain opportunities to display the actual contents, especially fancy fruits that are packed whole. Glass containers may use wrap-around bands or they may use spot labels. Different types of labeling machines are used for spot labels, which predominate on bottles and non-cylindrical glass containers. Spot labels use an adhesive over the entire surface next to the container. The adhesive is either applied by the labeling machine or by the use of pre-gummed paper. In using spot labels the quality of the adhesive is quite important, and the adhesive manufacturers have developed a wide range of special-purpose adhesives. On certain types of products and certain bottles, the objective is to affix the label for the term of its natural life, but on other bottles (beer and soft drinks) the adhesive is expected to give up its job after one trip to the consumer.

Bottles that are collected and used again for the same product may have the entire "label" blown in the bottle, and certain processes have been devised for obtaining color and decorative effects permanently applied to the walls of the container.

Some products regularly use a combination of paper labeling and blown glass labeling; for example, bottles for distilled spirits are blown with the contents statement and the statutory federal legend but nevertheless use very artistic paper labels. It is possible to concentrate all the mandatory label requirements on the cap or closure of the container although it is not customary to waste any container space that can be used to sell the goods *and more goods*. Per square inch of display space, container walls are usually esteemed to be among the most valuable of places which can be used for advertising purposes.

Fruit boxes

Fresh fruits and vegetables are packed in boxes of various sizes and capacities, which containers are standardized by Federal law. Many of the agricultural products themselves are standardized, and as such are permitted to be labeled with the letters "U. S."

Individual vegetables and fruits are often labeled to show the ranch or farm where grown. There is no doubt that such advertising helps to build up a demand from the public. When the consumer asks for goods by name, there is less difficulty in placing the product in the channels of trade.

Tight-wrapped packages

Containers with cylindrical walls are strong, which is the reason why they are used to protect fluid contents. However, containers may have rectangular walls, in the

case of tight-wrapped articles whose form and substance are adequate to withstand the trip from manufacturer to consumer. The fact that the wrapper completely envelopes the article and renders it *uninspectable* makes it "packaged goods," sold on faith, and therefore subject to labeling laws for the benefit of the innocent consumer.

The tight-wrapper of a set-up box is, or may be, its label. Of course the label could be on the box, just as it could be on a carton, provided the outer wrapper is transparent so as not to interfere with the legibility of the label. This would depend upon the availability of cellophane or other transparent wrapping material. Many tight-wrapped packages use specially designed papers. Candy bars and even chewing gums are in the category of packaged goods which are required by law to be labeled with a statement of the ingredients. Cartons and "shells" for cereal products are large users of tight-wrapped labels.

Greaseproof labels

Greaseproof labels are printed on a special greaseproof paper with special inks. They are placed directly on the food product in the case of cold meats, bakery products, and other foods. The paper is greaseproof and does not soil, or soak up grease and shortening. Special inks for the printing of such labels are also made to resist grease so that they will not run or "bleed off" on the food product.

Seals

The seals that identified the Sumerian pottery, the Egyptian papyri and the edicts of the Middle Ages have set the style for the elaborate dignity of their modern forms. Although made by the graphic arts processes they retain an individuality that befits the products to which they are attached. Label seals are usually embossed and die-cut to circular or oval shape; they make effective use of metalized papers or foil and they are often hand-embellished to produce elaborate artistic finishes. Gummed papers are often used for seals, in which event the particular kind of adhesive should be selected to suit the surfaces on which the labels are to be affixed. Seals are especially effective on jars and bottles for cosmetics and perfumes.

Decalcomania transfers

Decalcomania transfers are used for the reproduction of trademarks, brand names and other data upon packages of glass, metal, plastic or wood—any type of rigid container, in fact, which permits either the product or the surface of the package to serve as a background for the lettering or the decoration. This process of applying transparent labels to containers permits the use of a great number of colors and the attainment of highly decorative effects. Once properly applied, a decalcomania becomes a permanent part of the surface, withstanding cleaning and considerable wear.

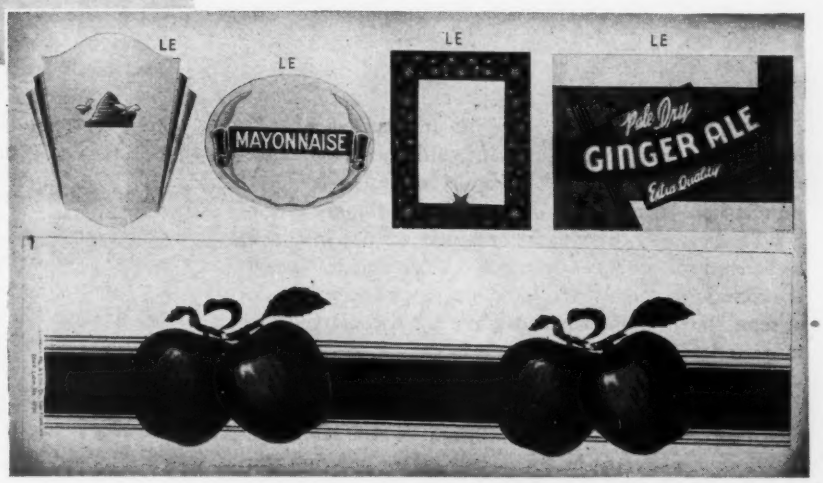
Transparent labels

The effects of a transparent label may be achieved on rigid containers and displays made of cellulose acetate or nitrate. The sheet of material is printed or stamped from roll leaf while flat and then fabricated into a three-dimensional container. If the printing is designed without a background, the transparent label becomes an integral part of the container.

Labels may be printed on sheets of cellulose film which are backed with a suitable adhesive to make them adhere closely to the walls of a glass or plastic container. Since the carrying material is thin and transparent, the type and decorative matter seem to be applied directly



4



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4. Convenience labels make no attempt to describe or identify a product, but are used to contain addresses or special messages. Of late "stickers" have been used to deliver war messages. 5. Stock labels are especially useful for small lots or to small producers for they permit the use of a many-colored label, imprinted to show brand and producer's name, at relatively low cost the producer.



6

6. The glass-packed product offers an opportunity for attractive and informative labeling. Several adaptations of labels which were formerly used on metal containers are illustrated.

to the surface of the container. When such printing is applied in reverse to the rear surface of the cellulose material, the label becomes impervious to stains, water, grease, etc. Such labels may be successfully applied to glass, plastics, metal, wood, rigid transparent cellulose and non-absorbent papers of all types. Patents are claimed for this process.

Glass labels

Decorative labeling effects of high order can be obtained through the direct application of color to glass containers. This treatment, at first restricted largely to dairy and food products, is now used in the cosmetic, pharmaceutical and proprietary fields. Fused-in colors are applied by the manufacturer of the container and are a part of the package itself.

Fibre cans

Different types of containers require different label treatment. Fibre cans are made with cylindrical walls and metal ends for dry powders and are even used as the outer protection of inside containers of viscous liquids in the non-food class. These fibre containers are not intended to be used for products that receive heat sterilization in the containers. However, recent developments in plastic or semi-plastic container walls have greatly enlarged the scope and promise of such containers.

Fibre cans may be labeled during their manufacture in which event the metal ends of the cans are crimped over the edges of the label. The dimensions of such labels are therefore a matter to be considered before ordering the labels sent to the can manufacturer. If the labels are to be attached by a labeling machine *after the cans have been manufactured*, they will have an entirely different set of dimensions.

Decorated metal

Until World War II cut off the tin supply many specialties were packed in decorated metal canisters (now called "cans," for short) if the prospective use and volume distribution of such containers could be considered permanent and readily anticipated. However, packers of food products subject to seasonal variations in quantity, grade and geographical distribution find it more convenient to adjust quantities through the use of paper labels.* Stocks of cans are therefore blank until the season's crops and destinations are known. Many canned foods are stored, unlabeled, until purchased by dealers who furnish the labels for their private brands. Among the products packed in lithographed cans, coffee has been a conspicuous example.

Informative tags

Utensils, appliances, tools, implements and equipment are labeled with *informative* tags or attached labels, because the article will give better service if its suitability is fully explained before it is selected by the prospective purchaser. Mere sales talk is never so convincing as the manufacturer's written claims, even if the salesperson is fully competent to conduct the sales negotiations.

Tobacco products are required to be labeled with the

* See also "Can Decorating", p. 266.

XUM

license number of the factory at which the excise tax was paid. Most cigars are labeled with a band, more or less ornate, to identify the brand.

Pre-gummed labels

The effectiveness of the little gummed label is not to be judged by its size—it accomplishes big jobs in a simple, unobtrusive way.

Take the Anti-Blabbermouth labels—reminders not to discuss ship and troop movements—shipments of war materials, etc. These precaution stickers are doing a fine job of assisting their big brothers, the war posters.

Then there is the production type of label that goes right into the war industry plants—labels used for parts identification, routing through the plants, inspection markings, tabbing "rush" jobs, and in a great many other ways. Simple though they may be, these labels have jobs to do, and they accomplish them.

Convenience labels

Convenience labels make no attempt to describe the contents of packages or the articles to which they are attached. Address labels are a familiar type, and there are innumerable "message" labels or stickers which serve a useful purpose when pasted on a package or even on a letterhead. Some of these labels partake of the character and dignity of postage stamps and are extensively used for advertising purposes. They are sometimes called seals although rectangular in shape, and sold in sheets with perforations.

Stock labels

Stock labels in semi-complete form enable small distributors to avoid the expense of special label designs and at the same time obtain quick delivery of quantities to suit their immediate needs. By imprinting a few additional details, "stock labels" are ready for use in less time than would be required to prepare special labels. Specialists in this line offer a wide choice of designs, not only for can labels but also for die-cut bottle labels.

Circulars

Circulars which accompany any product at the time of sale are defined by Federal law as a part of the labeling, therefore statements or claims made in the circulars are subject to the same limitations as the labels on the packages. Circulars serve a very useful purpose, however, in connection with many special foods which need explanation or the discussion of a dietary regime. Probably the possibilities of circular labeling have not been fully explored.

Outserts

The practice of using surplus label space to advertise other products has been extended still further by using the package or container as a carrier for circulars that are cleverly folded so as to remain closed when labeled to the outside of the container but are easily detached when the container reaches the hands of the consumer. These folded circulars have become known as "outserts." They can be labeled by hand or machine to the outside of cans, bottles, jars, cartons or bags. Their functions may be summarized as follows:

1. Variety of uses or recipes.
2. Cross advertising (using one product to help sell another).

They can also be used to promote premiums without wasted circulars and without cost for distribution.



7. Labels on fruit and vegetable boxes make colorful and interesting spots in the retail market, for the retailer usually exhibits his green goods so that labels will catch the attention of the customer.

XUM



1

1. Held to strictest accountability by several Government bureaus, liquor producers must be very specific in showing certain information on their labels. This doesn't stifle individuality, for liquor labels may be seen in all colors, styles, shapes.

Label statements—required & optional

Labels carry the messages by which physical objects describe themselves. What messages *must* they carry? What messages *may* they carry? Public opinion demands certain minima of truth and accuracy. To prevent false or misleading representation, many substances are required *by law* to be labeled adequately to inform the public regarding the true character of these substances. Laws also contain provisions that certain substances, if labeled, shall be honestly and correctly labeled. The sources of law are either Federal, state or municipal.*

Definable qualities of goods

Developments in labeling follow closely the progress made by science in defining properties and qualities of articles offered for sale to the general public. Research must first determine what properties are definable and must establish practicable tests and standards by means of which the labeled products may be tested for compliance with the standards. Unless compliance can be tested within a reasonable degree of accuracy, it would not be practicable to set up a legal definition and a penalty for offering a product that does not conform to the minimum legal requirement.

This practical view of the enforceability of minimum legal standards has resulted in the enactment of laws which *require* certain statements (frequently called "mandatory statements") but which nevertheless *permit* other statements (frequently called "permissive statements"), provided they do not directly or inferentially misrepresent the qualities of the product.

The mandatory statements in regard to any product are those statements which define the qualities which are likely to be misrepresented to the extent that an innocent purchaser might be harmed by the deception. The product should have the properties which are ordi-

* See also "Packaging Law," p. 77.

narily expected by the consumer, and the product should not be adulterated or misbranded to the extent that its value for customary purposes is deceptive.

The development of labeling laws

More than 35 years ago Dr. Harvey Wiley began his crusade against adulteration, misbranding and the use of preservatives to conceal inferiority in foods. As a result, the nation acquired the Food and Drugs Act of 1906, which immediately became the criterion of labeling in interstate commerce. Although intended mainly to require the disclosure of specified ingredients, the subsequent amendments to the law gave it the control of quantity declarations, and to a limited extent, a quality for each canned food.

More recently the Copeland Food, Drug and Cosmetic Act of 1938 has taken over and enlarged the scope of quality standards and the disclosure of ingredients. Many of the states have followed suit by passing similar or identical Food, Drug and Cosmetic Acts. Other Federal agencies have also been clothed with greater authority. Recent amendments to the Federal Trade Commission Act have given it more effective jurisdiction over unfair practices in commerce, including false representations in the sale of goods. Under authority of a special statute, the Federal Alcohol Administration has issued detailed regulations for the identification and labeling of liquors, wines and malt beverages. The procedures for determining standards now have all the force and, incidentally, all the intricacy of law. In fact, the principal activity of the Label Manufacturers National Assn. is the study and interpretation of laws, regulations and rulings as the basis of detailed advice to its members regarding correct labeling under Federal, state and local laws.

Label defined

The term "label," as used in the Federal Food, Drug and Cosmetic Act, means "a display of written, printed or graphic matter upon the immediate container of any article; and a requirement made by or under authority of this Act that any word, statement or other information appearing on the label shall not be considered to be complied with unless such word, statement or other information also appears on the outside container or wrapper, if any there be, of the retail package of such article, or is easily legible through the outside container or wrapper."

The term "labeling" means "all labels and other written, printed or graphic matter (1) upon any article or any of its containers or wrappers, or (2) accompanying such article."

The regulations state that "labeling includes all written, printed or graphic matter accompanying an article at any time while such article is in interstate commerce or held for sale after shipment or delivery in interstate commerce."

The mandatory label statements

The requirements of the Federal Food, Drug and Cosmetic Act in respect to food labeling are basically few in number. Generally, these requirements are: first, the *name* of the product, if defined and standardized under administrative procedure, otherwise a complete description including ingredients; second, the *quantity* in the container; and, third, the *identity* of the sponsor, and there is a possible fourth—if *artificial flavoring*, *coloring* or *preservative* is present, it must be declared. These three or four facts must be conspicuously shown on the portion of the label intended for display purposes. The only restriction of the remaining label space is that it may not be used to diminish the conspicuousness of the required statements or to mislead the purchaser regarding the actual contents of the container.

High lights of the Federal act

Compounds—The labeling of a product which contains two or more ingredients may be misleading by reason of the designation of such product in such labeling by a name which includes or suggests the name of one or more but not all such ingredients, even though the names of all ingredients are stated elsewhere in the labeling of the product.

Ingredients—The presence of spices, flavorings, artificial colorings or chemical preservatives must be stated on the label. A product consisting of two or more ingredients, if not defined by regulations, must be properly labeled to reveal the proportion of each ingredient. Even though not in package form, a food which contains spices, artificial coloring, flavoring or chemical preservative must be labeled to reveal that fact. Certain ingredients are required to be named if present in drug products.

Drugs—Detailed provisions cover the definition and labeling of "new" drugs. Certain provisions apply specifically to the labeling of narcotics or habit-forming drugs.

Scientific opinion—Where there is a material weight of scientific opinion contrary to a representation made on a label, this fact may render the label misleading and therefore illegal.

Distribution—If a product is not manufactured by the person whose name appears on the label, the name must be qualified by a phrase which reveals the connection such person has with such product, such as "Manufactured for and Packed by . . . . .," "Distributed by . . . . .," or other similar phrases which clearly express the facts in the case.

Street address—If the name of the manufacturer or distributor of a product is not shown in the current city directory or telephone directory, it is necessary that the label shall show the street address in connection with the place of business.

Conspicuous information—Any word, statement or other information required to appear on the label must be prominently and conspicuously shown on the part of the label which is presented or displayed under customary conditions of purchase. In other words, the consumer must have every opportunity to observe the facts in which she is or may be interested. Failure of the label to include all the essential information will not be ex-



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2 and 3. Two methods of grade labeling. Left: The voluntary indication of ABC grades according to Government standards, but without Government inspection. Right: Grade label on products packed under AMA inspection.

cused because of the fact that the label space is used for purposes not required under the statute or because of the fact that the label does not use all of the space available for it on the package.

English language—The English language is required for all mandatory label information, and if the label contains any representation in a foreign language, all words, statements and other information required by the Act must appear thereon in the foreign language. However, the foreign language must not be permitted to interfere with, or use the space needed for, the labeling which is required in the English language.

Contents—Detailed provisions cover the manner of stating the quantity of the contents in the package, and there is a provision that the statement of weight or measure may be supplemented by the metric weight or measure. With few exceptions the statement must express the quantity in terms of the largest unit of measure contained in the package. For example, the label on a package containing one quart is not permitted to read "2 pints" or "32 fluid oz." Provision is made for tolerances due to unavoidable conditions, and certain exemptions from the provisions are provided for very small packages.

Open containers—Under certain conditions, small open containers of fresh fruits or vegetables are not required to be labeled, but if two or more such containers are enclosed in a crate or other shipping package, such crate or package must bear labeling showing the number of such containers enclosed therein and the quantity of the contents of each.

Exemptions—Certain exemptions, under regulations, are provided for shipments of products in the trade, to be processed, labeled or re-packed. Exemptions are provided for export shipments if properly labeled according to the laws of the country to which such shipments are to be exported.

Special statutes*

Most of the states have enacted revised food and drug laws patterned after the Federal Food, Drug and Cosmetic Act of 1938. Generally, a substance that is properly labeled under the Federal law is also properly labeled under the state law, although in some cases the state laws contain additional or different provisions. Most of the states also have their own pharmacy laws which, so far as they relate to the labeling of drugs and poisons, are in accord with the Federal law.

Narcotics, etc.—The states also have their own laws controlling the sale of narcotics and habit-forming drugs, and their own laws in relation to specific poisons or dangerous substances, such as carbolic acid, bichloride of mercury and wood alcohol.

Alcoholic beverages are controlled by Federal legislation and detailed regulations in respect to the labeling of all intoxicating liquors. Some states also have their own laws on the same subject.

Beer and malt beverage labeling has had a hectic career in recent years. When cans were plentiful and cheap, canned beer enjoyed a very large distribution for a few years. Now it is difficult to obtain enough bottles. Like all alcoholic beverages, beer and ale are subject to state as well as Federal regulations. Everything shown on the label must be approved by the duly constituted authorities. Type sizes and pictorials are subject to strict rules.

Meat products—Many meat products are prepared and packed in the general manner of sterile canned and bottled foods. There are also other methods of placing *meat products in wrappers* or coverings which are required to be marked in establishments where the entire output is under Federal inspection.

Poultry products are packed under the jurisdiction of the Agricultural Marketing Administration under standards for both fresh and canned products.

Shellfish-packing establishments have the privilege of Government inspection under which they may label their goods in a manner to indicate that fact. Strict sanitary regulations in these cases cover the operations of the entire establishment.

Paints, etc.—Federal and state laws regulate the sale and the labeling of paint, varnish, naval stores, linseed oil, turpentine, putty and benzine.

* See also "Special Federal Regulations," p. 83.

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Substances not intended for human use or consumption include pet animal foods, stock or commercial feeds and tonics, livestock remedies, fertilizers and so-called "economic poisons" for destroying insects or pests.

Labeling of fabrics (except wool products) and other substances not sold in package form is not usually required by law, but if found falsely labeled, they can be reached by the laws which require honesty in advertising. There is a growing tendency to increase the legal requirements so as to compel complete disclosure regarding component materials and their qualities. The Federal Trade Commission has jurisdiction over honesty in advertising.

Certain devices are required by law to be placed on labels to protect the public: for example, the skull and cross-bones on poison labels. Among the things which may not be placed on labels are representations of the Flag of the United States or of any state. The Federal Alcohol Administration has prescribed a number of subjects which may not be depicted on any label for alcoholic liquors.

Trade practice conference rules—The Federal Trade Commission has approved trade practice conference rules establishing standards and labeling requirements for jams, jellies and preserves, and many other products outside of the food line.

Guaranteed quality standards of certain products are indicated by "Seals of Approval" furnished by *Good Housekeeping* magazine, the American Medical Assn. and by some trade organizations.

Labels that undertake to state or imply that products comply with *Federal* specifications should conform to the regulations of the National Bureau of Standards in regard to the language of quality-guaranteeing labels. If the National Bureau of Standards tests a device and issues a certificate applying to that device, the manufacturer may advertise (label) that fact, provided he does not create the impression that the National Bureau of Standards has tested and approved the manufacturer's line of products.

Protecting the consumer

It is fair to state that no movement towards informative labeling can proceed far without the active interest and coöperation, if not the initiative, of actual consumers. The standardizing and defining of grades and qualities by official, quasi-official and purely voluntary organizations stems from the demonstrated need for better information and better understanding on the part of the consuming public. The various organizations of consumers have performed yeoman service in pointing out the needs which subsequently motivate the official determinations of standards made available by label declaration and honest advertising. The part taken by the Federal Trade Commission in preventing false and deceptive advertising claims has been of enormous benefit to the public and incidentally to the great body of honest distributors who find it difficult to contend with the inducements offered by unscrupulous competitors. Labeling is a form of advertising and, to the extent that the Federal Trade Commission has jurisdiction, both primary and concurrent, with other agencies, may be the object of solicitous care on the part of FTC.

The genesis of label terminology

Today's field of permissive labeling will be tomorrow's field of mandatory labeling. In other words, the exploration of the definable qualities of goods, and the consumer's expectations with reference to such goods, leads to the adoption of semi-official standards which, if used as label terms, acquire a legal meaning with reference to the qualities of such goods. At the same time, such exploratory investigations of definable qualities lead to simplification and standardization of terms, which, through their educational value to consumers, justify a reliance upon the goods so labeled. Consumer education in respect to definable qualities eventually leads to the legal adoption of such terminology.

Various expressions have been used in respect to the twilight zone of label terms. "Grade" labeling has received semi-official sanction in respect to certain foods for which intermediate standards have been officially adopted. "Descriptive" labeling is a term which connotes an educational process in relation to the labeling of canned foods. "Informative" labeling is a similar term used for the same general purpose, but more frequently applied to fabrics for the purpose of assuring that their quality shall be suitable to the average consumer's expectations.

A-B-C grades

Although the Food, Drug and Cosmetic Act does not require that the Department of Agriculture shall establish more than one standard for a food product, nevertheless the Department, acting through its agency, the Agricultural Marketing Administration, has developed methods of grading certain canned fruits and vegetables and has designated such grades as A, B or C, according to the score sheets and the summation of factors having numbered values. A canner may grade his own fruit and vegetable products and may employ grade terms that he has set up for his own use, except that he may not use the terms "Grade A," "Grade B" or "Grade C," unless such labeled products meet the requirements for the specified grade as defined by the Agricultural Marketing Administration.

U. S. Grades (ABC)

Inspectors of the Agricultural Marketing Administration of the United States Department of Agriculture have been located in certain canning factories under the "continuous inspection" experiment, requested by the canners who pay the cost of the service. Government inspectors are on duty all the time the plants are in operation, observing each step in the preparation of the product. Inspectors are furnished only to plants that are using AMA grade terms in the labeling of their products. All these plants meet certain strict requirements relating to housekeeping and sanitation. Only canned fruit and vegetable products packed in plants under the

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"continuous inspection" of the Agricultural Marketing Administration may carry the prefix "U. S." in connection with the grade designation.

Consumers can buy grade-labeled canned goods—with or without the "U. S." prefix—in many retail stores throughout the country. If the prefix is used, however, it means that the product has been prepared in a plant operating under continuous inspection of the Agricultural Marketing Administration, and that the inspector has certified the grade. If the prefix is not shown, the grade statement means that the packer or distributor assumes the responsibility for the grade designation.

Textile labeling

Apparently the use of alphabetical grade terms is not equally applicable to all commodities. Speaking before a recent session of the American Association of Textile Chemists and Colorists, E. M. Edgerton, of Pacific Mills, is reported to have said:

> Graded Terminology A, B, C, D and the resultant inequalities have also been extensively explored. This type of grading so dear to the heart of the professional consumer may well apply when only a general all around quality is to be expressed, as for meats, canned fruits or eggs, but when a number of different qualities are to be described, depending upon the use of the product, good descriptive terminology with required accompanying care and handling instructions, if set up in Fair Trade Practice Rules, will better serve the interests of the consumer than dependence on the technical ability of the sales person to interpret properly the relative value of grades A, B, C or D, for colorfastness to washing, light, wet and dry pressing, perspiration, wet and dry crocking, cleaning wet and dry and gas fading. The causes and effects of these proposed Fair Trade Practice Rules, regardless of their original intent and conception, are now far more important than many people realize. They have a direct bearing on our civilian economy and production, and thus on our part in our fight for the kind of existence to which we believe we are entitled. A misrepresentation, either in labeling or even in the abstinence from labeling, which results in the discarding of an article of wearing apparel, because of unsightliness, before it has served its normal usage purpose, is as much an act of sabotage in the wastage of our prime weapon, production, as any fifth column or subversive activity.

Descriptive labeling of foods

The never-ending search for definable characteristics of products is well illustrated in the experience of the National Canners Assn. The requirements of Federal law as to purity and wholesomeness and the basic standard of quality still leave opportunity to produce canned foods having individual and varying characteristics. The housewife is enabled to select among good products, something which will suit her own and her family's tastes and likes; she is relieved of the necessity to distinguish between shoddy and good products. Certain fundamental principles have been developed by the canning industry which may well apply to the labeling of any consumer goods.

The fact that a purchase at retail is not a matter of discriminating between good and poor but is largely a matter of individual preference (special use), simplifies the labeling problem in one respect. Individual preferences have a way of surviving and it is unwise to establish or indicate what may be presumed to be general preferences. The indicated course is to state characteristics in commonly understood words and to let each purchaser make her own selection. Or, to put it another way, the most informative label is the one which carries the most complete set of specifications phrased in ordinary, non-technical words.

Nearly a decade ago the National Canners Assn. created a labeling committee composed of leading growers and canners, guided by the NCA staff of research experts and field representatives in contact with consumer opinions. The Labeling Committee has set forth the basis for the "adequate label" in the following:

> The adequate label for canned foods states separately in specific terms, uniformly used, readily understood by the ordinary person, and in legible type so arranged as to be easily seen and read, every fact about the product which is genuinely useful to the consumer and which can be stated. For the sake of uniform use and of equitable and ready enforcement, each term is either self-defined or is based upon an objective definition and standard.

NCA puts it this way:

> Terms for label use must be single words or short phrases. Terms must be specific—generalities permit too much latitude in use and allow too much variation in consumer interpretation. Terms must be common words or phrases, readily understood by the ordinary person. "Very young" as applied to canned peas means more than "alcohol insoluble solids 12%." Terms must be either self-defined, such as "half" peaches or "peeled" apricots, or they must be based upon objective standards as in the case of "uniformly red" used for canned tomatoes. This requirement is essential to insure uniformity of use and to simplify enforcement under the misbranding section of the F. D. & C. Act.

The method employed by the Labeling Committee of the NCA in establishing terms for label use is believed to be practical and realistic. The industry produces many products, each of which must be considered individually. At the same time, the labeling of each product must follow general principles, uniformly applied.

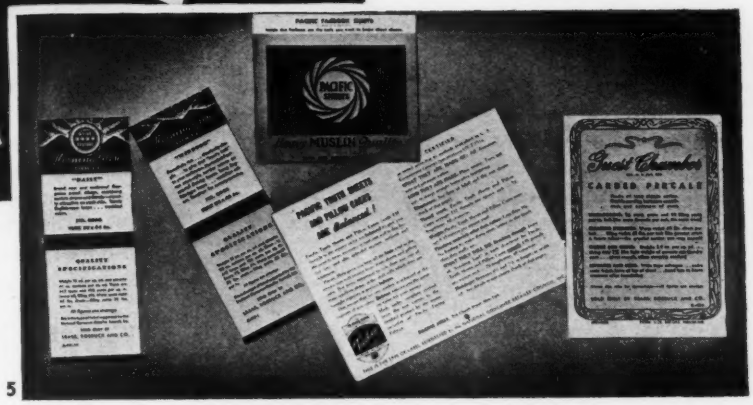
The functions of an individual NCA commodity committee are:

1. To review and analyze the differences which may exist or the characteristics which may vary in the product as it is found displayed on the shelves.
2. To select the characteristics which are important to the consumer. In some cases this is relatively easy. In others it is necessary to go to groups of consumers for their decisions.
3. To select label terms to identify the characteristics which are important. Frequently this is the most difficult part of the job. Trade terms are satisfactory only when they are also good consumer terms. Here again, it is necessary to go to the consumer to settle the question.
4. Terms having been selected, standards for the terms must be established. Sometimes additional steps must be taken. Further procedure consists of making trial packs, laboratory tests, examination of many samples representative of general production and conference with the product committee.



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4. Booklet distributed by manufacturer to supplement informative labeling and to explain what tests product is subjected to and how tests are conducted, in line with the recommendations of the National Consumer-Retailer Council.



5

5. Type of informative label suggested by National Consumer-Retailer Council showing thread count, breaking strength, etc. Informative labeling, reduced to definite principles, results in major benefits to manufacturer and consumer.

When these steps have been taken, the recommendations of the individual product committee are reviewed and acted upon by the general labeling committee. This procedure has been successfully employed for most of the important fruits and vegetables.

If the consumer is to benefit to the fullest extent from complete description or specification, the label must be so arranged and printed on the display area that the information will be easily seen and quickly read. To accomplish this purpose, the labeling committee, in its recommendations, has followed the examples and principles of the newspaper headline which is constructed to tell a story at a glance. The committee further recommends the use, on the back panel, of a "table of facts," which is a summary, in tabular form, of every item of importance to the consumer.

The design of labels for consumer guidance need in no way, and should not, interfere with individuality, brand emphasis, shelf appeal or merchandising values, according to the NCA labeling committee.

What the canned-food consumer wants

The National Association of Food Chains has taken an interest in the development of informative labels for canned foods and the testing of consumer opinions. In submitting the plan to its member organizations, NAFC states that labels should carry the following information in addition to established requirements of the Federal Food, Drug and Cosmetic Act: (1) Grade designation; (2) comparative scoring; (3) description of contents; (4) under certain conditions, an optional test byline, e.g., "This is the type of label suggested by the National Consumer-Retail Council."

A food packer with a national reputation has made a careful study of the consumer's state of mind when approaching the problem of selecting canned foods. This study reveals that the following questions are most frequently asked:

1. What size can should I buy?
2. How many sizes are there?
3. What size can is this?
4. How many persons will it serve?
5. How may the contents best be prepared?
6. Does the product contain added sugar or salt?

This authority also suggests certain additional points which should be considered in connection with the preparation of a label:

1. If the particular product is packed in other size cans, list them all with the weight statement, etc., so that the consumer may select the size best suited for her needs.
2. When a particular variety, such as asparagus, peas, stringless beans, lima beans, etc., is marketed in different sizes under one brand name, a statement of this fact should be made, listing the different sizes available and listing their designations.
3. When a product, such as corn, is prepared in different styles, an explanatory statement should ap-

pear along with a list of the other styles available.

4. Include at least one good recipe—a different one on each size can—and vary them as each run of labels is made.

For a distributor marketing a complete line of canned foods, this authority also emphasizes the importance of uniform composition and arrangement of subject matter. A consumer who becomes familiar with this pattern will be more likely to select other items in the line. Trade terms constantly repeated will eventually become familiar—for example, the numerical designation of can sizes, especially when accompanied by the weight statement.

The N.C.A. manual

The NCA has now issued a new edition of its Labeling Manual which includes a table of label terms for all canned fruits and vegetables and most of the seafoods. This table gives both the mandatory terms and the terms recommended for voluntary use. Another section gives the standards on which the voluntary terms are based. The manual also contains a set of full, four-color, full-size, example labels designed primarily to give the consumer information.

Informative labeling of fabrics

The National Consumer-Retailer Council emphasizes that informative labeling offers very real advantages to the manufacturer, the retailer and the consumer. The first requisite, of course, is that labels shall conform to local, state and Federal regulations applicable to the particular product. The council has summarized its analysis by listing the following points:

What it will do (*performance*)

Degree of color permanence; shrinkage or stretching; breaking strength; seam slippage; resistance to water, perspiration, wind, wear; light, heat and power tests; power consumption; cost of upkeep.

What it is made of (*composition*)

Kind and quality of fibre, metal, wood, leather, ceramics, cement, rock, fur, plastics, petroleum products, rubber, paper, bone, chemicals, drugs; ingredients of food products; etc.

How it is made (*construction*)

Size, weight, number of yarns per inch, weave, number of stitches per inch, finish, ply, cut, hand or machine made, pressed, molded, stamped, inlaid.

How to care for it

Detailed instructions for washing and/or cleaning; precautions to be observed in cleaning or storage; refrigeration; oiling and greasing; polishing; etc.

Recommended uses

Purposes for which it is most suitable; recipes; etc.

Name of manufacturer or distributor

Name and address of the manufacturer or distributor.

Color fastness in dyed textiles

The labeling of dyed textiles raises certain problems which are peculiar to this kind of merchandise. Recently the call for informative labeling has attracted national attention owing to the moves of the Federal Trade Commission to set up standards for textiles which will indicate to the consumer the exact degrees of color fastness of fabrics and garments. Extensive hearings have been held, in which manufacturers, distributors and consumers all have had a voice. While there has been disagreement on the phraseology and on the technical details, it is significant that throughout the hearings everyone agreed that informative labeling is serving a worthy purpose in educating the public to standards of quality.

It is readily appreciated that a color which is fast to washing is not necessarily as fast to light, or to crocking, or to other color-destroying agencies. Fabrics are designed for the use to which they are supposed to be put, and standards are set so that the fabric will last longer when put to its intended use. If it is used for some purpose other than the one for which it was intended, then full warning should be given that it may not be as serviceable.

What the label does

An authority on the use of informative tags insists that a trade name is desirable for every product, or line of products. This authority, in discussing the benefits to be derived from the carefully planned use of informative tags, summarizes the advantages as follows. The use of informative tags does these things:

1. ***Establishes a trade name***—The name being on the merchandise at the point of sale, it sticks in the mind of both clerk and customer. The importance of establishing a trade name is further indicated by surveys which have shown that more than 50 per cent of retail sales may be due to the selling-power of a well-established name.
2. ***Acts as a silent salesman***—Keeps the customer occupied until the clerk can serve her; saves the clerk's time by answering questions the customer must otherwise address to him.
3. ***Trains salespeople***—Gives them the basic facts and strongest selling arguments—and phrases—concerning each product; is of especial help to the new salesman—and, similarly, facilitates transfers of clerks from slack to busy departments during holiday seasons.
4. ***Gains the good will of consumer organizations***—By presenting facts.
5. ***Promotes correlated selling***—By mentioning other items in the line.
6. ***Cuts losses on returned goods***—Helps the customer make the proper initial selection; helps to eliminate returns due to improper use or care of an article. Verbal instructions cannot take the place of a written reminder.

7. ***Re-sells the purchaser after the sale***—An informative tag on a product helps to maintain the state of mind that prompted the original purchase—a corrolary to the above.

8. ***Meets legal requirements on marking***—When the law requires certain information on a tag, that tag might just as well also carry some special selling information.

9. ***Combats vicious competitive prices***—A tag or label on better merchandise can justify the difference in price between the more costly quality products and competitive cut-price goods.

10. ***Fosters step-up selling***—A customer will often willingly pay $3.98 instead of $2.98 if it is made clear that extra wear, extra satisfaction, extra comfort, etc., go for the extra dollar.

11. ***Makes advertising more effective***—Reminds the customer, at the vitally important point of sale, of all the advantages stressed in other advertising. A tag fills the time-gap between the moment of reading a company's advertising and the moment of arriving at the decision to purchase—a gap which frustrates many sales.

12. ***Helps the merchandise buyer***—He can classify the product in his line, and buy more intelligently. It may also show up unnecessarily numerous price lines, thus suggesting the elimination of some of them.

13. ***Improves customer relations***—By infusing store customers with confidence in the performance to be expected from the article . . . provides a new means of interesting customers in what they are buying and provides striking evidence of the store's willingness to give the consumer facts about what the store is selling.

14. ***The consumer benefits from informative tags and labels because***—(1) Anything that helps to reduce the cost of merchandising and selling is eventually reflected in lower prices to him; and (2) an informative tag or label which enables him to buy, use and care for merchandise more intelligently, conserves his income and raises his standard of living.

6



6. Labels adopted by nationally known producer after careful study of "consumer state of mind when selecting" canned foods. Note information about size of can, number of servings, how to prepare, etc. 7. Exhibit of labels which follow recommendations of National Canners Association for descriptive labeling giving every fact about the product which is genuinely useful to consumers.

7



Label space as advertising

Label space used for mandatory statements is usually a small part of the available space which can be used profitably to praise the labeled product or to advertise other products sold by the same distributor. The space is extremely valuable because it works at the point of sale, assisting the merchant in arousing the customer's interest and favorable consideration. After the goods are sold, the effective label space continues to exert a strong influence with Mrs. Consumer by stimulating the desire to use the goods and to benefit by such use. No product is fully sold until it is consumed. The bigger the label, the better it works, especially in the home where it confronts the whole family. This is notably true of the wrap-around style of labels on food cans and jars. Recipes and suggested food combinations take the foods out of the pantry and onto the family table. To quote one very level-headed authority: "The most satisfactory method for communicating information from manufacturer through retailer to consumer is a label attached to the product." This quotation is attributed to Mrs. Saidie Orr Dunbar, president of the General Federation of Women's Clubs. Circulars or "outserts" that accompany the goods are in the same class, so far as attention-getting value is concerned. Like labels they ride free into the home and right up to the last hurdle.

Required statements use 10 per cent of space

Legally, all parts of the label and of the circulars accompanying the goods are a part of the labeling and are subject to the same regulations in respect to their claims.

The required label statements need only a small amount of space—less than 10 per cent of the area of an average can label. The larger part of the space on can labels is exceedingly valuable as a medium to reach and influence the consumer. The packers of food products are especially fortunate in the amount of space at their command. The trend of distribution methods and the development of product descriptions have together operated to place the consumer in position where she expects the product to tell its own story, completely, truthfully and interestingly. That situation is not unwelcome to the dealers and the middlemen; they would rather handle a product that relieves them of responsibility; they would rather display and otherwise encourage the sale of goods whose labels obviously strive to interest and please the consumer.

Fourteen optional uses of free label space

In contrast to the few mandatory statements, it is interesting to note the wide range of permitted uses of label space. An examination of many labels now in use reveals at least fourteen ways to use label space to increase the prestige of the product. For example:

1. ***Brand name***—Experience and tests combine to prove that the memory factor is most closely associated with the idea of a well-chosen brand name. For protection, brand names are usually registered in the United States Patent Office.
2. ***Trademarks*** are usually special designs which are used to identify all of the products which have been put on the market by certain manufacturers.



"Tight wraps" employed on prepared flour, uncooked cereals, etc., are really labels with a double duty—they protect the contents from sifting and infestation and also present broad areas which the manufacturer uses as advertising panels to carry recognition marks, illustrated directions for use, premium offers and other consumer information.

3. ***Vignette***—Next in importance as an aid to the memory or identification is a picture or vignette. Among certain classes of consumers, the picture is more of a memory factor than the brand name.

4. ***Side panel***—The side panel of the can has recently become a sort of overflow-space to supplement the front panel of cylindrical containers and to feature a complete statement of so-called government information.

5. ***Background***—The background serves to contrast and enhance the artistic value of the label and may be used in an all-over design to visualize the product.

6. ***Recipes***—Recipes have been found to serve the consumer's desire for suggestions of variety in the preparation of foods. It is possible to print recipes on the reverse side of can labels. Visualized recipes are the natural color reproductions of appetizing dishes prepared from the contents of the can. In recent years, food processors have awakened to the great merchandising possibilities of their can and jar labels. Developments in the field of direct-color photographic reproductions have stimulated the interest and have made it possible to utilize the eye appeal which has so important a part in determining choice and selection. Recipe labels have been developed through the aid of home economic and food authorities. Various vegetables and fruits are prepared in appetizing and attractive servings, photographed in full color, and reproduced on canned food labels in various combinations along with the recipes for the preparation of such foods. In addition to capturing consumer interest at the point-of-sale with a colorful display of attractive servings of food content, recipe labels specializing in eye appeal maintain consumer interest at the point-of-sale in the housewife's kitchen by showing her how to prepare and serve such dishes. Thus, with eye appeal at point-of-sale and appetite appeal at point-of-use, colorful recipe labels accomplish a two-fold stimulant to the sale of the product. They attract prospective buyers in the food store and influence repeat business by maintaining interest.

Even under present shortages and point rationing, the recipe labels are holding consumer acceptance and building good will for the products of the canners who use them. The proved merchandising power and sales-building value of this type of label point to an even more extensive greater use after the war.

7. ***Back panel***—Other items in the line are mentioned on the back panel, sometimes accompanied by color reproductions of such items or of dishes prepared from such items.

8. ***Novelty designing***—It has been found that foods for the very young are more acceptable if decorated with juvenile themes. An interesting development in this line was a prize winner in a packaging contest.

9. ***Dietary claims***—If any product is represented as of value in correcting a dietary or vitamin deficiency, it is a food for which special regulations under the FDC Act will apply.

10. ***Premium offers***—Coupons and prizes can be advertised on the labels.

11. ***Special appeals***—Foreign languages are often used in addition to English on products that appeal to the foreign population. If any required statements are in the foreign language, all the required statements must be there in both languages.

12. ***Awards***—Reproductions of exposition medals and awards for merit are believed to increase the prestige of the product. They must be genuine and in accord with the facts.

13. ***Endorsements***—Seals of approval authorized by such organizations as the American Medical Assn. or *Good Housekeeping* magazine.

14. ***Display labels***—Labeling for display purposes includes a two-way arrangement of text and picture, so that either upright or horizontal position of the can may be viewed equally well. This was a first-prize winner in a recent packaging contest. The development of self-service markets has brought to light some interesting observations about the mental reactions of women shoppers in relation to a display of goods; they will not pick up goods if the act is likely to disturb or disarrange the display; they will not touch a stack of goods that has the slightest appearance of instability, but they will pick up from a jumble of cans lying on their sides.

CREDIT

Most of the illustrations in this chapter indicate by code marks the following label makers to whom credit is due for help in supplying representative samples:

BA Bartlett Label Co.
BC Brandau-Craig-Dickerson Co.
CA Calvert Lithographing Co.
CW Courier-Journal Job Printing Co.
EP Epsen Lithographing Co.
EU Eureka Specialty Printing Co.
FP Fleming-Potter Co.
FR French-Bray Printing Co.
FX Foxon Co.
GA Gamse Lithographing Co.
KR Richard M. Krause
LA Lambooy Label & Wrapping Co.
LE Lehmann Printing & Lithographing Co.
MD McCoy Label Co.
ME Magill-Weinsheimer Co.
MN F. E. Mason & Sons
MS Milwaukee Label & Seal Co.
MU Muirson Label Co.
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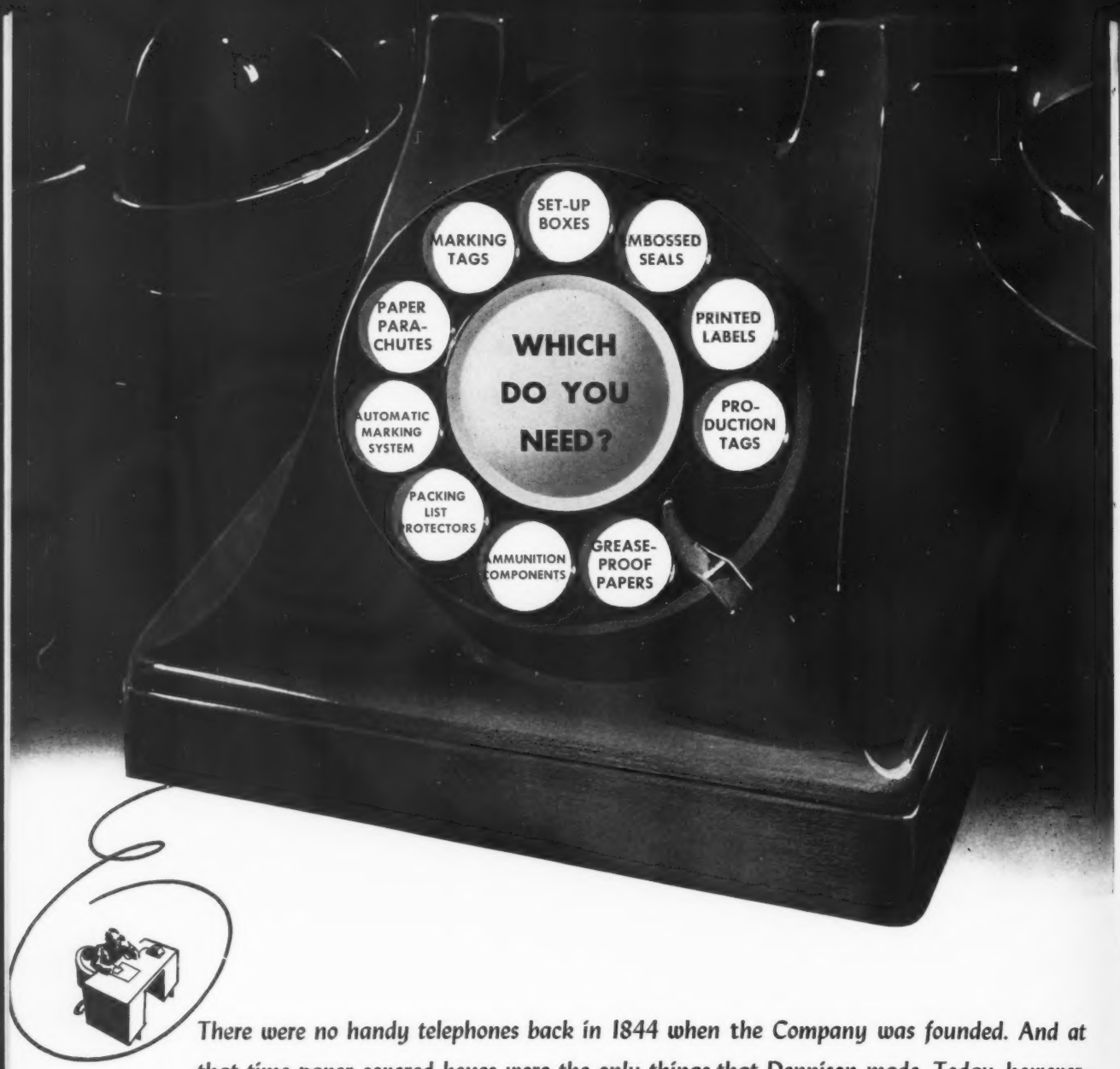
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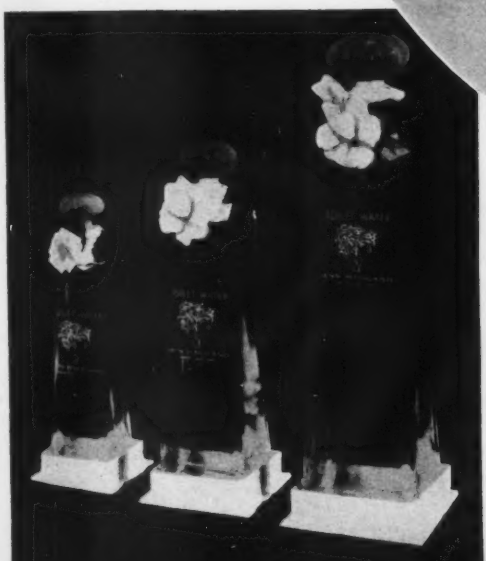
ADHERE DECALS

by Palm

CREATORS OF
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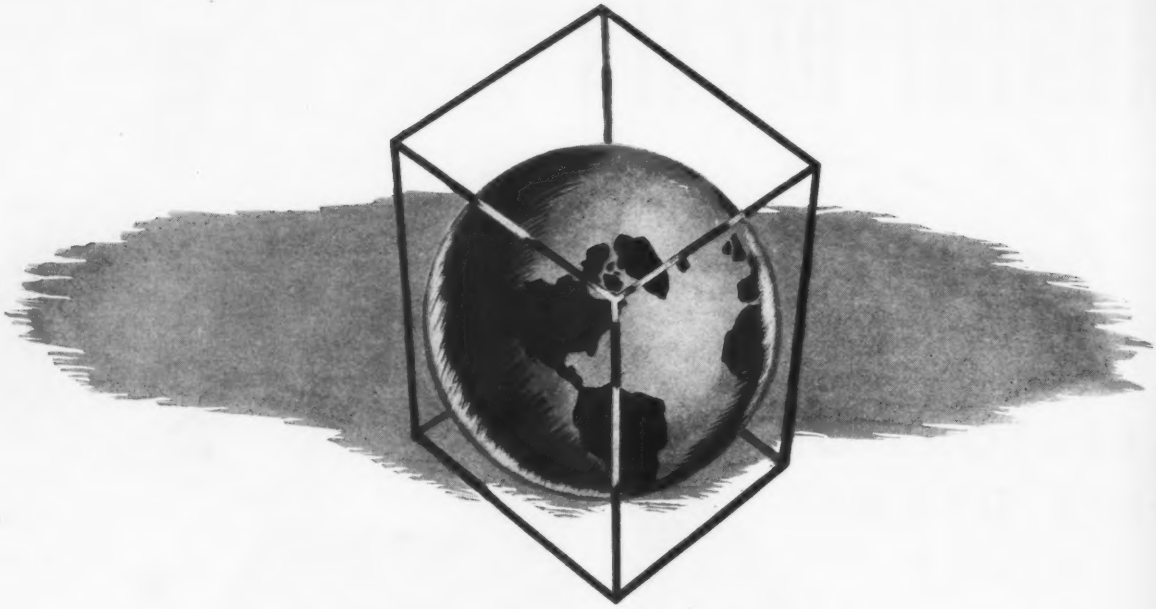


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PLASTICS FOR PACKAGING

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Design and Manufacturing Considerations 335

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War and postwar developments

The packager who has been largely barred from plastics during the war needs a thorough briefing in the wartime developments in this field and their future significance.

Although the benefits have scarcely been felt in packaging in other than strictly military uses, technological development of plastics has been tremendously accelerated by the war. Immediately at hand upon the lifting of wartime restrictions is a vastly expanded supply of improved plastic materials, capable of being formed better and more economically by new and improved manufacturing methods.

Improved mass-production methods are constantly cutting costs of molding and fabrication, and after the war plastics will directly benefit from war-expanded capacity for their constituent chemicals. When the ammunition industry ceases to function as such, vast quantities of phenol, formaldehyde, cellulose and other chemicals will be available for the various types of plastics. Similarly, a substantial portion of an annual capacity of 200,000 tons of styrene—now going into Buna S—will be available for the very important polystyrene plastics.

But plastics' biggest wartime gain, from a packaging standpoint, has been in protective functions, and of these the moistureproof films, coatings, adhesives, laminations and impregnated materials have been outstanding. Each of these subjects is fully discussed elsewhere in this volume.*

New materials

Films.—The vinyl resins have emerged as the bases of important new films. Vinylidene chloride (Saran), which as of this writing rates high among all films on the market in moisture-vaporproofness, had barely been introduced to packaging before the war when it was snatched up by the armed forces and strictly limited to military wrappings. It has done an impressive war job. Vinylidene chloride film is difficult to produce and not low in price, but it must be considered wherever utmost moisture-vapor protection and ease of heat-sealing are required, as in the case of frozen foods.

The vinyl chlorides (Vinylite, Koroseal) make tough flexible films which are waterproof but not at present particularly water-vaporproof. They have excellent chemical stability, are greaseproof, and they are relatively low in cost. They are now being produced in volume and will be available for many postwar applications.

New films are constantly being developed. One of the latest is a polyvinyl chloride derivative (Goodyear V-Film), which is said to have superior tear resistance and general mechanical strength.

Many interesting possibilities are found in the new film form of nylon, which is one of the toughest transparent films yet developed, although it may at present be lacking in some other qualities.

Coatings—The new polyvinyl butyrals are not cast as films alone but as films coated on other materials, putting them in the classification of coatings—another field in which outstanding wartime advances have been made. The new vinyls, particularly, and the cellulose derivatives, used as coatings or impregnants, largely made possible the tremendous wartime job that paper has done as a packaging substitute in many forms. Plastic resins as coatings made possible lightweight tin coatings of electrolytic plate and bonderized plate for canning to extend the wartime supply of tin. As closure liners, they have contributed to the success of new closure materials.

Adhesives—Progress in the use of resinous adhesives has been most impressive. The thermoplastic resins—cellulose derivatives, acrylic, styrene, vinyl and alkyd—have been widely used because of their clarity. Thermosetting resins—phenolic, urea, melamine and the new allyl alcohols—have come into use because they have many superior qualities.

Laminating resins—Not only have these resins become important for both hot and cold sealing, but as laminating agents they are responsible for many of the recent very effective laminated wrappings, bags and containers which make use of paper, glassine, cellophane, foil and various plastic films.

Impregnating materials—War also has developed the use of plastics to impart high wet-strength properties to paper. Various processes use melamine-formaldehyde, urea-formaldehyde and regenerated cellulose.

Perhaps the most important development in this field is V-board, which is impregnated and laminated with a plastic, usually urea-formaldehyde. Early adopted as the standard container for export shipment of military supplies, particularly food and medical necessities, V-board is a big packaging achievement of the war.

Molding compounds—One of the more important new plastics for packaging consideration is polystyrene. A thermoplastic, polystyrene is new only in the sense that it has been commercially available only since 1937; its history goes back to 1831. A versatile material, it can be molded, machined or fabricated in any of the conventional ways. It is normally transparent but is readily colored in any hue. Its outstanding properties include exceptional chemical resistance, water resistance, dimensional stability, high index of refraction, high impact strength at low temperatures, freedom from taste or odor, ease of molding and accurate mold finish. Wartime applications include high-frequency insulators, closures for chemical bottles and medicinal dispensing closures. Postwar, it will undoubtedly be widely used as a material for molded closures.

* See Chapters XI and XII.

Polystyrene has shared interest with the thermosetting urea-formaldehyde in the tremendous wartime job that has been done on molded closures. When restrictions at the start of the war cut off metal closures, plastics took up the burden in such a way that there was no interruption in the flow of essential products to the civilian market.

Miscellaneous—Newest of all the plastic materials is polyethylene, which has been announced only during the past year. Presently restricted to direct war uses, polyethylene is said to be capable of many packaging forms, including collapsible tubes, waterproof and chemically resistant coatings, and adhesives.

To meet the threat of the brand-new competitive thermoplastics, the cellulose products are being made with substantially improved properties. Cellulose nitrate will be available at low cost because of Government-financed plants for economical production of ammonia, nitric acid and cellulose nitrate itself. Cellulose acetate butyrate and new formulae of cellulose acetate are making a strong bid for packaging business. Ethyl cellulose—tough, inert and flexible—has an important new use in the hot-melt dip coating of machined parts.

An inorganic mineral element, silicon, has been combined with organic radicals composed of carbon and hydrogen to produce a new group of plastics called Silicones, resistant to temperatures as high as 500 deg. F.

Another new material is Penacolite, said to be a phenolic-type thermosetting resin which cures rapidly at temperatures from 60 to 150 deg. F.

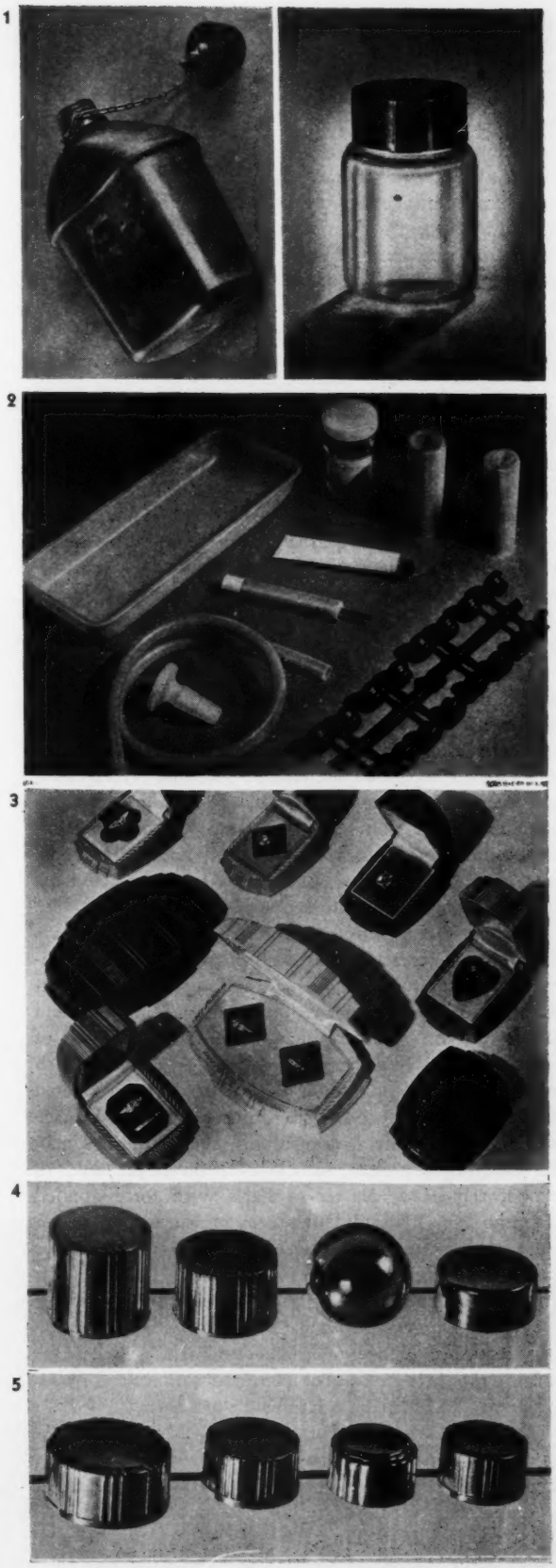
New methods

Developments in the technique of handling plastics emphasize the trend toward lower cost and have much significance for the packaging field. Many improvements in both methods and materials are still tightly held war secrets, but enough can be revealed here to show what is afoot.

Improvements in high-frequency molding, jet molding, rapid, continuous injection molding and improved transfer molding point the way to more rapid production. Urea molding materials are now on the market which may be automatically stripped from the mold while hot, so that it is possible for the first time to mold closures in the pastels rapidly and to expel them automatically.

Ingenious continuous extrusion processes and advances in the blowing of plastics—to the extent that a blown plastic bottle is now being produced—have contributed to further extension of the markets for thermoplastics.

Handicaps in handling bulky, high-strength plastics such as the fibrous-filled are being overcome through im-



1. Canteen molded of ethyl cellulose (left), a big war item; blown polystyrene bottle (right) may be important postwar factor. 2. Newest of all materials is polyethylene, which may have uses in collapsible tubes, closures, coatings. 3. Fancy molded display containers will again be available when restrictions are lifted. Photo courtesy Durez. 4. New process applies metal plating to plastic closures. 5. Monsanto phenolic molded by Owens-Illinois.

proved mechanical processing techniques. Difficulties due to lack of flow are being minimized with high-frequency preheating and pulp molding applied to fibre-resin preforming. The use of mixed laminates with lower pressures for molding and postforming of thermosetting laminates is making intricate designs possible.

Blowing of thermoplastics—One of the most interesting new techniques is borrowed directly from the glass industry to form a plastic product which may to some extent be a competitor with glass. A new process for the blowing of bottles of polystyrene lends itself to the rapid, automatic production of these first successful plastic bottles exactly as their glass counterpart is produced.

The blown plastic bottle is an actuality. It is being produced in large quantities for the Army Medical Corps for use in medical field kits, with the advantages of non-shatterability, a 75 per cent saving in weight and a 20 per cent saving in cubage.

Molding with high-frequency preheating—Widespread application of high-frequency heating in molding operations has been one of the most conspicuous wartime advances in plastics. For packaging it is chiefly interesting for its use in preheating preforms for compression and transfer molding.

The preform is placed between two metal electrodes installed near the press and a high-frequency current passed through it. Because of the peculiar molecular stresses set up, the material heats rapidly and evenly and within a few seconds is partly plasticized. Molding pressures are reduced and intricate forms "fill out" with greater facility. In compression molding, the mold closing time has been cut from as high as $1^1/_2$ minutes to under 20 seconds, and in transfer molding, pot closing time has also been cut and curing times reduced.

Low-pressure molding of laminates—After several years of intensive research, it is now possible to mold laminated structures at low pressures and at reduced temperatures, with a consequent reduction in molding time and hence in cost. Structures may be built up of layers of resin-impregnated paper, fabric, glass or asbestos, with or without the application of heat, to form a cohered laminated structure possessing unusual physical properties. At extremely low pressures, such moldings may be made in hat presses, autoclaves or on simple molds of wood, cement or plaster of Paris with force applied through air, hydraulic or steam pressure.

Pulp preforming and molding—The new resin-fibre, or pulp molding, process involves felting a fibre preform from a bath incorporating water-soluble thermosetting resin, removing volatile matter and molding the resulting resin-fibre preform under heat and pressure. The resulting products are comparable in appearance and water resistance to ordinary compression moldings.

Dip-coat packaging—Pure packaging is a recently developed Ordnance-approved method of protecting machine parts for export shipment by simply dipping them in a special molten ethylcellulose compound which imparts a skintight coating approximately $^1/_{10}$ in. thick. This "skin" is proof against any ordinary shipping bumps and jolts and provides exceptional protection against corrosion. Mechanized methods have been developed for rapidly handling the dipping operation.

Plastic "welding"—One of the most important new fabricating methods in the plastics field is one that makes use of a super-adhesive thermosetting plastic (Cycleweld, Reanite) which permits the inseparable bonding—comparable to welding—of metal, wood, plastics, ceramics, fibres and rubber. The cement, of undisclosed formula, is simply applied to one of the two surfaces to be joined and the union then effected under a cycle of moderate heat and pressure.

Equipment trends—Developments in equipment for molding and fabricating plastics are all in the direction of high-speed, automatic operation and lower per-unit cost of product. Because actual manufacture of recently developed machinery has been limited during the war, the packager is due for some pleasant cost surprises.

Thermosetting materials can be injection molded in regular automatic injection equipment with a special attachment, and they are also being extruded experimentally. The commercial sizes of injection molding presses have steadily increased from the original 1-oz. to 2-, 4-, 8-, 16-, 22-oz. and even to 32-oz. sizes. Output per cycle is thus now measured in pounds rather than ounces.

One notable development is a rotary indexing press for the rapid, continuous injection of thermosetting materials. The indexer regulates a turntable set-up with 12 different molds or stations. A measured amount of heated material is injected at high pressure into each mold as it reaches the injection nozzle. As the machine continues to revolve, the work cures in the mold, and there is no press delay for curing or removing the work.

More than ever, the packager considering the application of plastics to his products must familiarize himself with the technical aspects of the field, for plastics is not one material but a group of 30 or more materials, and the packager's job is to find the one best suited to his needs. Having chosen he must answer these questions:

1. Is the application under consideration sound and functional?
2. Are the costs in line?

In this connection, he will do well to call in his molder or fabricator and material supplier for consultation. The plastics industry has become, in the main, a very conservative one; it has no wish to oversell itself, and responsible representatives of the industry will be the first to point out the limitations of any given material and advise against its unwise use.

While the wartime emphasis in packaging has been on the protective functions of plastics, there will be renewed and increased interest in the visual aspects—transparency, color and design. Texture, or "feel," is also a significant advantage.

At this writing, all plastic materials are under allocation. (See table, "Packaging Materials Under Government Control," pp. 23–24.) Up-to-date information as to the availability of any plastic for a packaging purpose may be obtained from appropriate Government agencies, or from the manufacturer or molder.

Basic definitions

Plastics are synthetic organic materials which, at some stage of their manufacture into finished products, soften into a plastic form and are hardened or fixed into any desired shape by the application of heat and pressure.

Plastics are organic materials derived from nature; viz.: coal, air, water, natural gas, petroleum, salt, etc. In various formulations they are combined with elements like hydrogen, oxygen, nitrogen, also derived from natural materials like cellulose (from wood or cotton) or proteins (from skim milk, corn or soy beans). Fundamentally, plastics are a reorganization under heat and pressure of basic elements and chemicals into new forms.

As synthetic (man-made) materials, plastics can be manufactured with almost any given set of built-in characteristics. They can be as hard as metal or as pliable as rubber; they can be a thin, transparent film or a solid block. They may be transparent, translucent or opaque; mottled or solid color, pastels or black. They may be resistant to many chemicals, to moisture and weather conditions; they may have excellent qualities of durability, strength and beauty.

MATERIALS

Thermosetting materials

Plastic raw materials come as powders and flakes for molding; as liquids for coatings and castings; as sheets ranging from very fine gages to very heavy ones; as rods, tubes and shapes for machining. There are two basic types of plastics: thermosetting and thermoplastic.

Thermosetting materials are those which, when molded, undergo a change in molecular construction and assume a permanent, unchangeable form. They cannot be remolded; they cannot be ground up for re-use as scrap. Thermosetting materials of importance in packaging are:

Phenol-formaldehyde—With its many different fillers, phenol-formaldehyde is one of the oldest of the thermosetting resins, and the largest single plastic in point of volume. It is universally adaptable to many and varying requirements by merely changing the filler in the compound. As an example, for standard closures requiring a medium strength, wood flour is used as a filler, but where higher strengths are required, string, sisal or shredded canvas may be used. Phenolics are molded usually by compression or transfer.

The color range of these compounds is one limitation. No pastel shades are obtainable, and the lighter colors are not recommended even though available due to the great amount of inert filler necessary to produce them.

The phenol-formaldehydes find their principal packaging uses in molded bottle and jar closures and in molded containers of many kinds.

The material is produced in the form of molding powders in the following major groups: general purpose, non-bleeding, heat-resistant, high impact, arc-resistant, moisture-resistant, high dielectric, acid-alkali-resistant.

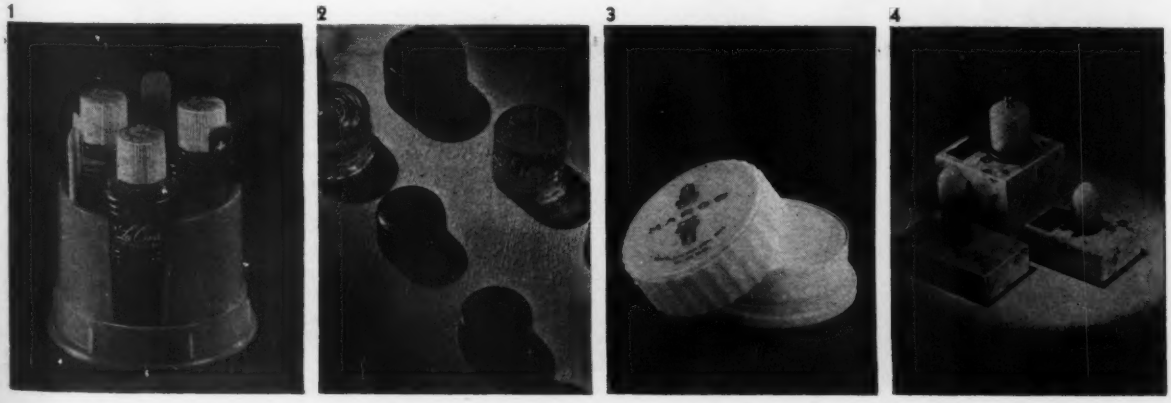
Trade names of the molding compounds are *Bakelite*, *Durez*, *Durite*, *Makalot*, *Resinox*, *Textolite*, *Insurok*. Trade names of the cast phenolic resins are *Bakelite Cast Resinoid*, *Catalin*, *Catavar*, *Catabond*, *Gemstone*, *Marblette*, *Opalon*, *Prystal*.

Phenol-furfural—General characteristics of this material are somewhat similar to those of phenol-formaldehyde, and its usual applications fall in the same general class; namely, molded closures and containers.

Phenol-furfural is available in one- and two-stage resins, liquid resins, fusible resins and varnishes, and molding compounds with various fillers. It can readily be handled by compression or transfer molding, while the liquid resins are available for laminating.

Among the outstanding properties of phenol-furfural are superior moldability, high rigidity when hot, freedom from scorching or burning at high molding temperatures, chemical inertness, water resistance and superior

1. Re-use container of cellulose acetate. Bakelite, molded by Amos. 2. Molded polystyrene closures of Dow Styron. 3. Container for face powder molded in urea. Photo Libbey-Owens-Ford. 4. Machined from cast phenolics. Catalin.



electrical properties. The color range is approximately that of the phenol-formaldehydes.

The trade name is *Durite*.

Urea-formaldehyde—For packaging purposes, the outstanding characteristic of urea is color, including the pastel shades. As a molding material, it is widely used for closures (for both bottles and collapsible tubes); containers, display boxes, etc. As a water-soluble resin, it is frequently used to treat paper, cloth or wood veneer in laminating, and it also may be used as the binding material on the surface laminae of sheets, where other resins have been used as the principal binder. This surface treatment makes possible pastel surface colors without necessitating the use of the resin throughout the lamination. As a laminating material, urea finds an outstanding use in V-board.

In combination with a finely divided alpha-cellulose pulp, the urea resin may be formed in a molding compound available as a powder or granule. Since the resin is colorless and the filler a pale white, the addition of dyes permits actual color reproduction over the entire spectrum.

Molding material is usually handled by compression molding; it does not lend itself readily to transfer or injection molding. Physically, its outstanding properties are that it is odorless, tasteless and resistant to organic solvents. Its surface is hard and durable, and the molded section is rigid, light in weight and strong.

Urea-formaldehyde is available in the following forms: resins in solution for laminating, resins in solution for textile treatment, hot- and cold-setting adhesives, molding powder or granules.

Trade names are *Bakelite Urea*, *Beetle*, *Plaskon*, *Uformite*.

Melamine-formaldehyde—First made commercially available in 1939, the melamine resins have much to recommend them. They give excellent wet strength to paper and paper containers; they are fine adhesives, and they can be molded into a number of forms with good physical and chemical characteristics.

Melamines are available as resins in solid form and in solution, as mineral-filled molding compounds, as alpha-cellulose-filled molding compounds and as cotton-rag-filled molding compounds. Molding is usually by direct compression or transfer methods.

Melamines are odorless, tasteless and inert; resistant to hot water, organic solvents, alkalis and weak acids, and have high dielectric strength and resistance to heat and abrasion. They have good color possibilities.

Trade names are *Catalin Melamine*, *Melmac*, *Plaskon Melamine*.

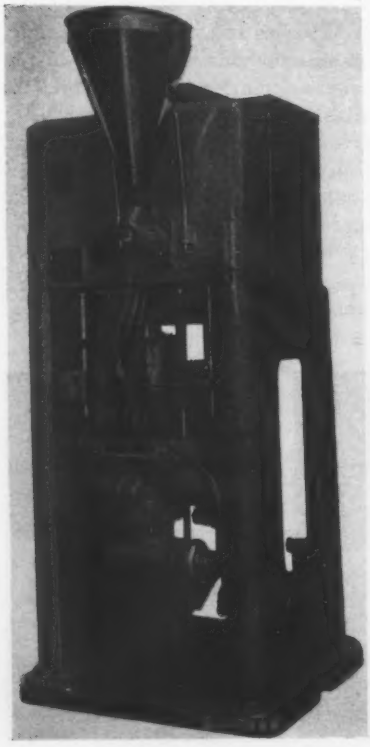
Lignin—Up to the present time, due to war conditions, the lignin plastics have not been used to any great extent in packaging, but there is little doubt that they will take their place along with pulp-formed articles and laminated materials in the postwar packaging field. They are used principally in laminating and impregnating, and the resulting products have properties approximately the same as those laminated with phenolics. The lignin plastics also can be made into sheets.

Trade names are *Benalite* and *Lignolite*.

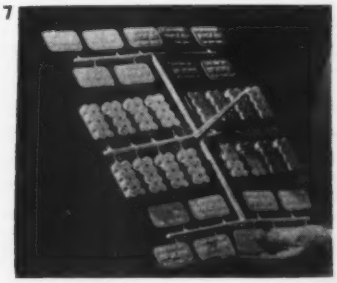
Thermoplastic materials

Thermoplastic materials differ from thermosetting in that they can be remolded again and again, if need be. Rigid

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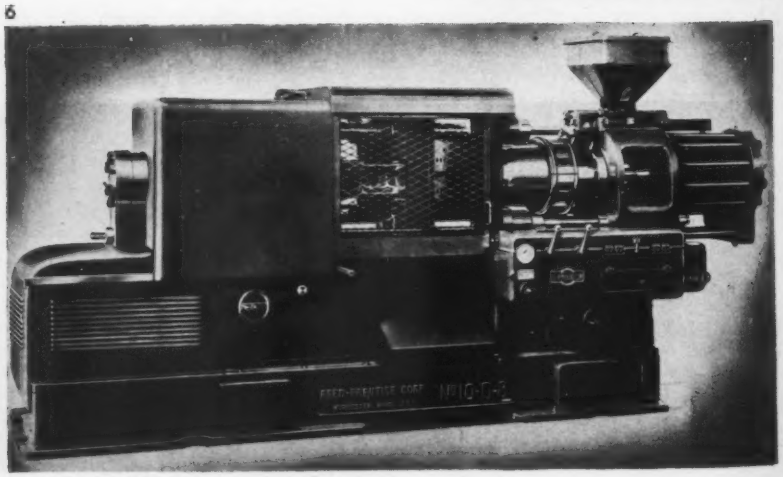


7



5. Typical example of a fully automatic compression molding press. Photo courtesy F. J. Stokes Machine Co. 6. Self-contained Reed-Prentice injection molding machine. 7. This is the way small transparent pill boxes look when they emerge from an injection molding press—16 boxes to each 20-minute cycle. Sprues which hold the parts together are simply snipped off and often may be melted and re-used in press.

6



and stable at ordinary temperatures, they will return to the plastic state whenever subjected to the proper degree of heat. The fact that their molding reaction is purely a physical and not a chemical phenomenon makes them particularly suited for injection molding (being melted and shot into a cold mold for forming) and extruding (being squeezed through a die of any desired profile). As a group, thermoplastics are colorful, lightweight and tough. They provide most of the transparent containers, and have proved themselves well suited to the manufacture of closures and packages generally. Their heat-softening quality, however, precludes their use where abnormal heat may later be encountered by the finished article. The principal thermoplastic materials of importance in packaging are:

Cellulose acetate—This material is most familiar in sheet form, in which it is drawn or fabricated to form transparent boxes, containers or display packages. Articles molded of cellulose acetate, by compression, injection or extrusion, are mechanically strong and durable with relatively thin cross sections. The material has excellent wear resistance and dielectric strength. It can readily be made translucent or opaque, and it can be colored in any shade of the spectrum.

The material is available as powder for molding and as sheets, rods, tubes or extruded profiles.

Trade names are *Bakelite Cellulose Acetate*, *Lumarith*, *Fibestos*, *Nixonite*, *Plastacele*, *Tenite I*, *Vimlite*, *Vuelite*, *Vuepak*.

Cellulose acetate butyrate—The butyrate is largely similar to the cellulose acetate, but has some individual characteristics such as excellent dimensional stability, excellent waterproofness, good resistance to heat, resistance to boiling water, and excellent welding properties. It has high impact strength and excellent weathering qualities. It also can be made transparent, translucent or opaque, and it has unlimited color possibilities.

The material is available as granulations or pellets for injection or compression molding. Molded objects can be machined with wood tools at reduced speeds.

Trade names are *Tenite II*.

Ethyl cellulose—Outstanding properties of this versatile material are well demonstrated by its recent use in a compound which makes a hot-melt dip for coating machine parts, forming a tough, weatherproof "skin" which replaces Ordnance Methods I or I-a packaging. In general, ethyl cellulose compounds have the characteristic of low-temperature flexibility; they are excellent, therefore, for packages, package parts and closures which must withstand sub-freezing cold while retaining impact strength. The material has unlimited clarity and color possibilities. It is resistant to water and alkalis; is of low density and has dimensional stability. It is soluble in inexpensive solvents.

Ethyl cellulose comes in powder or flake form for injection, compression or extrusion molding; in sheets up to .020 gauge; in films and foils of continuous length up to .020 gauge, and in uncompounded form for lacquers, coatings, etc.

Trade names are *Ethocel*, *Ethocel PG*, *Ethofoil*, *Hercules Ethyl Cellulose*, *Lumarith E. C.*, *Nixon Ethyl Cellulose*.

8



8. Typical examples of cosmetic containers made of acrylic resin. Material, Plexiglas, by Rohm & Haas Co., Inc.

Cellulose nitrate—Cellulose nitrate is the oldest of the plastics currently manufactured; it is the original celluloid. Its packaging importance lies principally in its use as a surface coating for cellophane.

In general, cellulose nitrate is available in the form of lacquers, emulsions, sheets, rods, tubes and chips. It has excellent water resistance, is tough, very colorful but also very inflammable, and it is the latter point which limits its usefulness. It is used for such molded articles as pencils, rulers, handles, dials, crystals, etc., and may be fabricated not only by molding and blowing but also by cutting, sawing, drilling and turning the molded forms.

Trade names are *Amerith*, *Celluloid*, *Hercules Cellulose Nitrate Flake*, *Nitron*, *Nixonoid*, *Pyralin*.

Polystyrene—In addition to high physical, optical and color qualities, polymerized styrene is valuable in packaging applications because of general inertness and high resistance to acids and alkalies. It may be used for closures on products where no other plastic could be used.

With its high index of refraction, its variety of bright colors and its high gloss finish, polystyrene can be used in the molding of packages which present the luxurious effect desired in many fields. It has been used during the war to make a successful plastic bottle, by blowing, and new, high-temperature forms have recently been developed. However, most styrene resins are exceptionally resistant to heat, although they are easily and quickly injection molded. They can also be extruded. A film form is expected to be available after the war; otherwise, polystyrene is now manufactured as molding powder and in sheets, rods and tubes; also as extruded forms.

Other outstanding properties of polystyrene include low specific gravity, excellent water resistance, dimensional stability, low molding shrinkage, ability to "pipe" light, high dielectric resistance.

Trade names are *Bakelite Polystyrene*, *Loalin* (*Catalin polystyrene*), *Lustron* (*Monsanto polystyrene*), *Styron* (*Dow polystyrene*).

Vinyl resins—The vinyls are best known in packaging for applications in which their non-toxicity is an impor-

tant factor. The various polyvinyl esters are widely used as coatings for packaging materials.

Polyvinyl acetate is clear, has a zero acid number, is tasteless and odorless. Polyvinyl chloride is resistant to water and chemicals, tough, odorless and tasteless. Copolymerized vinyl chloride and vinyl acetate are non-warping and non-shrinking, tough, strong, rigid, chemically resistant, odorless and available in colors.

Trade names of the vinyls in various forms include *Vinylite Resins*, *Koroseal*, *Saran*, *Butacite*, *Butvar*, *Saflex*, *Saflex TS*, *PVA (du Pont)*, *Resistoflex*, *Formvar*.

Acrylic resins—The transparent polymethyl methacrylates have found wide use in displays and packages because of their crystal clarity, impact resistance, ability to conduct light around corners, edge lighting and weather resistance. They are rigid, water resistant and have exceptional permanence of dimension. They are readily colored if desired. They have light weight and high impact strength. They are chemically resistant, and as adhesives and coatings offer the advantages of freedom from bacterial and fungus deterioration and the possibility of a colorless, transparent bond.

Acrylic resins are available as compression and injection molding powders, sheets, rods, tubes, solutions, inorganic solvents and aqueous emulsions.

Trade names are *Acryloid*, *Lucite*, *Plexiglas*.

METHODS

Depending upon the form of raw material, plastics can be molded, extruded, drawn, formed, laminated, cast, cut, sawed, drilled, glued, stamped, branded or otherwise fabricated. The principal manufacturing methods are:

Compression molding—Compression molding is the oldest and most widely used method of manufacturing both thermosetting and thermoplastic materials.

Molds generally consist of two parts; one, the force, which forms the inside, and second, the cavity, which shapes the outside of the molded part. The plastic material, in powder or pellet form, is inserted into the cavity of the mold and the force is depressed by hydraulic pressure. Heat is applied simultaneously, causing the plastic material to flow in the mold and assume the desired shape. For the general run of phenolic and urea materials, pressures of from 2,500 to 4,000 lbs. per square inch are required. Heat usually is applied by means of steam run through cores in the mold. Molds may be made with one cavity to produce one part at a time or with multiple cavities to produce a number of articles simultaneously.

9. Cemented cylinders of acetate plastic sheeting for displaying sachet figurines. Photo from Eastman Kodak Co.

9



Most compression molding presses are hand controlled, but a number of automatic machines are available for the molding of small units on a continuous production basis with an operator being in attendance on several machines. For closure molding, a rotary type of automatic press is used in which a series of molds move in rotary fashion, being filled at the start of the revolution and going completely through the curing cycle to the ejection of the finished product as the mold wheel rotates. Other equipment strips the caps from the threaded force plugs without unscrewing.

Injection molding—Rapid injection-molding machines have been used in this country only since 1934. At first they were used only on thermoplastic materials, but more recent developments have permitted adaption of the process to some thermosetting compounds. The process is essentially to heat the plastic in one section of the machine and then to inject it, under pressure, into a closed mold where it cools rapidly (almost instantaneously) and can quickly be discharged as a virtually finished piece.

Generally, several parts are molded in a single operation in a multiple-cavity mold. The parts come out as a unit resembling a branch or twig, and are easily broken off from the sprue and runners.

Injection molding's principal advantage is speed, with resultant economy in mold costs. The method is particularly adapted to the fabrication of small boxes and closures when volume production of a uniform high quality is desired.

Extrusion—Extrusion is a method of forcing molten plastics through a die of the desired shape to achieve a continuous length strip of the profile of the die opening. Plastic is squeezed from the machine like toothpaste from a tube, in the desired shape, cooled and trimmed in lengths. Hollow tubes, solid rods or complicated profiles may be obtained. Thermoplastics are especially suitable for extrusion into continuous lengths, and techniques are being developed for handling thermosetting materials in the same way. It is high-speed production, and has many possibilities in the manufacture of packages and package parts.

Transfer molding—Transfer molding is a process whereby a thermosetting material is subjected to heat and pressure and then "transferred" under pressure into a closed mold cavity and cured therein. It is a form of injection molding of heat-hardening materials, and differs from the injection molding of thermoplastics in that the mold is maintained at elevated temperatures and the parts are ejected from the mold without any cooling. Transfer molding is employed mainly where metal inserts are required in a part; it has not as yet found any large use in packaging.

Mold making—Molds for plastics, made from special tool steels, represent one of the highest forms of the tool maker's art. After the mold has been cut in the steel, it

is usually heat hardened. To attain an extremely high finish and to minimize wear on the mold, chromium plating frequently is used.

When multiple-cavity molds are utilized in order to secure volume production, lower cost or higher speed of production, special economies frequently can be effected, since the cost of duplicating a mold or cavity is substantially less than the cost of making a new one. Hobbing is frequently employed in making multiple molds, and automatic duplicating machines, both manual and automatic, are often used. Duplicating machines are high-speed vertical millers which follow a template to make an exact copy in the mold steel.

Other methods used include electro-deposition and the forming of molds by spraying molten metal.

Lamination—The lamination of materials with plastics used as the binding or impregnating agents results in the production of sheets, rods, blocks or tubes, made of wood and resin, cloth and resin, fibre and resin or paper and resin, which can then be molded or fabricated by ordinary woodworking or metalworking techniques.

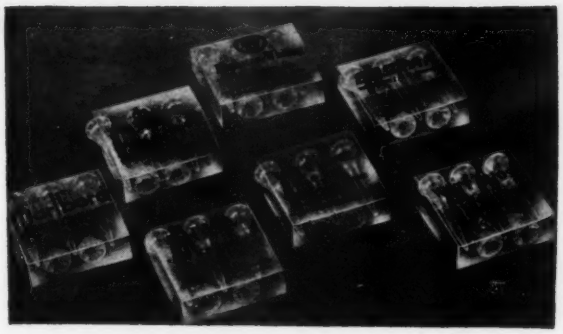
Lamination is a process that has gained greatly during the war, particularly with the development of superior adhesives and impregnating materials and low-pressure methods. Entire airplane fuselages and wings are being very successfully molded in this way. It is obvious that there is wide possibility of application to the packaging field. Such large items as barrels and drums can easily be, and have been experimentally, formed by this method, as well as smaller containers. Plywood tubing, now being wound both spirally and convolutely, has obvious possibilities. The plywood material is exceedingly strong and resilient, since it has the structural strength of wood plus the chemical resistance and strong chemical bond supplied by the plastics. Containers so made are strong, light in weight, chemically inert and naturally insulated.

Fabrication—Plastics in sheet form, including the transparent sheetings, are usually made into containers by either the *set-up* method—cementing or sealing several cut pieces together—or the *drawing* method, molding the sheet in a single operation in dies under the action of heat and pressure. All sorts of shapes may be drawn or fabricated—ovals, circles, hemispheres, oblongs and more complicated designs. Generally, drawn containers are restricted to longer runs because a mold cost is involved and must be amortized over the production run—unless a stock mold is used.

Much equipment was being developed before the war to facilitate the fabrication of plastics from sheets, rods and tubes. The largest amount of development work was being done on sheet materials, and several companies had developed automatic or semi-automatic equipment to manufacture both drawn and set-up containers and displays from sheet plastics.

Set-up rigid plastic containers of cylindrical form are customarily shaped on a mandrel and lap-seamed with solvent cement. Beading, a form of edge finishing in which heat and pressure are used to turn and form an edge into a firm round curve, may be done by machine.

10



10. Acetate sheet containers, filled with plastic golf tees and printed. Monsanto material, by Shaw Paper Box Co.

Bottom and top discs of the same plastic sheeting or other material may be attached by various methods of cementing, but telescope lids, made exactly like the container, are often used. Rectangular set-up containers are made up of one or more blanks cut from sheets which are folded, assembled and cemented in the required shapes; in cementing, rectangular blanks are used instead of round mandrels. Seams on set-up transparent containers are sometimes secured by sewing, stitching or eye-letting, where siftproofness is not required. Metal edging is sometimes used as a stay material.

Drawing, or sheet molding, is widely used for producing seamless rigid containers from such material as cellulose acetate, ethyl cellulose and vinyl resins. This method consists basically in transforming a more-or-less two-dimensional sheet into a three-dimensional form by means of dies in a drawing press, under heat and pressure. Drawing differs from embossing in that sufficient material flow takes place in drawing so that the wall thickness of the finished piece is uniform and approximately that of the original sheet stock. Embossing, on the other hand, assumes that a certain amount of stretching takes place, with consequent reductions in wall thickness. Some manufacturers combine both processes—drawing for strength and embossing for unusual effects. It is possible to design and mold contours, ribs or corrugations similar to metal stampings to get extra strength and rigidity.

Casting—Cast plastics are cast as liquids into inexpensive lead or rubber molds and cured by baking to the hardened state without the application of pressure. They are available in both thermosetting and thermoplastic materials in sheets, rods, tubes and in a wide range of standard shapes. A number of stock cast resin shapes are available normally from manufacturers in the form of boxes, box bases, tops, etc. Otherwise, the castings are machined by the use of woodworking machinery. Cast plastics have an advantage in packaging where a limited number of units is required, because of the very low mold cost. The use of molds of natural or synthetic rubber is a recent development permitting the casting of intricate shapes, such as small statuettes. Cast display plaques with designs in relief have the effect of woodcarving.

Considerations for use

Aside from the important new paper impregnations, coatings and films, which are reviewed elsewhere in these pages, the bulk of all plastic packaging falls under three generic headings: closures, containers, product displays.

The packager considering the use of materials in any of these categories must decide (1) whether plastics are best suited to his purpose and (2) what particular plastic material he should choose. The outline of plastic materials and manufacturing methods in the preceding section of this chapter should throw some light on these questions.

It is necessary to recognize certain fundamentals. First among these is the fact that plastics are sturdy, long-lived materials best suited to use as containers or container parts where continued use after the product has been sold is to be anticipated. A case in point is the popular use of molded plastic threaded closures on cosmetic and drug bottles and jars.

A second, and equally important, factor is the attractiveness of plastics and the variety of effects which may be obtained. Plastics of one type or another may be had in every shade of color, including pure white and black; they can be transparent, translucent or opaque. Another sensory consideration is the pleasing feel, or texture, that plastics have. Plastics may be fabricated into an infinite variety of shapes and be decorated in a number of ways.

A third point increasingly recognized lies in the chemical advantages or disadvantages that plastics may have. Many of the packaging plastics are chemically inert and non-toxic; others would not be suitable for direct contact with corrosive or solvent substances or with foods or cosmetics. Similarly the packager must consider whether his material must withstand sunlight and aging effects.

Depending upon the use, attention must be given to such physical properties as tensile and impact strength, elongation, elasticity, dimensional stability, solubility, water-vapor permeability and the possible effect of extreme heat or cold that might be encountered.

On all of these questions, the advice of a reliable molder or material supplier should be sought. For the packaging engineer who wants his own source-book of technical data, however, the best authorities are the annual PLASTICS CATALOG* and the monthly publication MODERN PLASTICS.†

From the point of view of cost and the results achieved for a given expenditure, plastics suffer, to a degree, from limitations that do not apply to all other packaging materials. The plastic raw materials vary greatly in price among themselves. Although the general price trend is downward, most of them are still relatively expensive materials.

For most plastics which are fabricated by a molding process, unless advantage is taken of existing stock molds,‡ a substantial charge must be added to amortize the cost of the molds. Thus, most plastics are too expensive to utilize on short runs of packages for limited-production products.

Lengthen the run, however, and a different situation begins to arise. The amortization charge per piece drops proportionately. The economies incident to the elimination of hand fabrication begin to become apparent as a run increases, a break-even point appears (varying, of course, with each plastic package) where the plastic competes cost-wise with other materials.

Not all plastics fall into this category. Some plastic containers and a larger number of displays are fabricated from sheet, rod and tube material. Here die costs are eliminated and hand labor costs, which do not decrease particularly with the increase in the length of a run, are substituted.

* Plastics Catalogue Corp., 122 E. 42nd St., New York, N. Y., $6.00.
† Modern Plastics Corp., 122 E. 42nd St., New York, N. Y., $5.00 per year.
‡ See "Stock Molds," p. 335.



1

1. These typical containers of transparent cellulose acetate illustrate the varieties of shapes and applications possible with this material. Both luxury packages and advertising give-aways are shown. Material, Monsanto Chemical Co.'s Vuepak; molded by the Central States Paper & Box Co.

Closures†

The bulk of the many millions of plastic jar and bottle closures produced each year are molded, by compression or injection methods. The thermosetting materials are most often used for closures, and of these the phenolics and ureas are largest in volume. Polystyrene, which is classed as a thermoplastic, is of increasing importance in closures where acid resistance is desired.

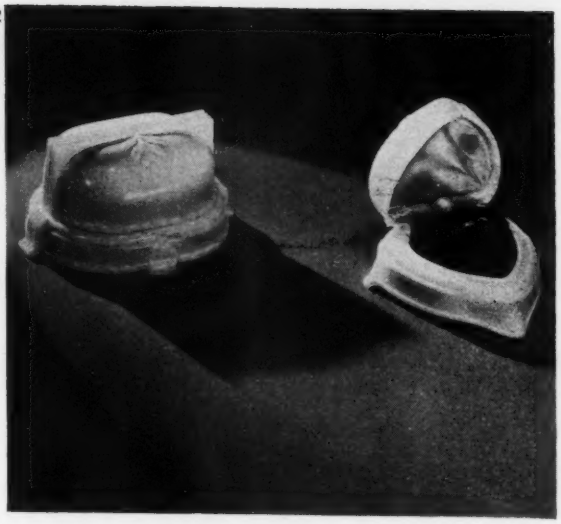
Phenolics offer exceptional designability and are available in many colors—although they are not unlimited in color range and are most often used in black or dark colors. Molded phenolics have a natural high lustre, are desirably poor conductors of heat and cold and have exceptional mechanical qualities such as light weight combined with great strength and resilience to shock. Some earlier disadvantages have been overcome and phenolics are available today which are completely odorless, have great resistance to acids and mild alkalies, and are non-bleeding and non-bleaching. Almost any color with the exception of pastels may be obtained, and improved dyestuffs have provided richer blacks. Strength and durability have been increased and cost of molding lowered by improvements in material and equipment.

Urea plastics are available in shades of color lighter than most of the phenolic group. This is because urea syrup, before the condensation process which reduces it to powder has taken place, is a water-clear liquid. It therefore gives full value to pigmentation and pastel shades may be definitely controlled; even white and ivory are available. To the manufacturer whose package depends upon daintiness of color for sales appeal, urea may be the ideal molding compound, provided, of course, that its chemical properties are suitable to the job. Urea is higher in price than the phenolics, but the advantage of color often may justify the difference.

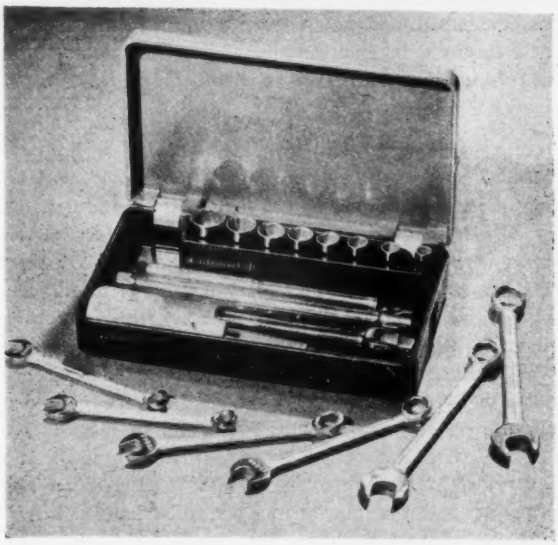
Generally, urea moldings are insoluble and inert, resistant to greases, oils and solvents. They are tasteless,

† See "Closures, Finishes, Liners," p. 213.

2



3



2. Cellulose acetate ring boxes. Molded by Standard Novelty Box Co. 3. Tool box with integral partitions. Molded by Rathbun Molding Corp. 4. Polystyrene cosmetic containers. Photo courtesy Monsanto Chemical Co. 5. Dispenser machined from cast phenolic resin. Photo Catalin Corp. 6. Containers made of cellulose derivative. Photo Lusteroid.

4

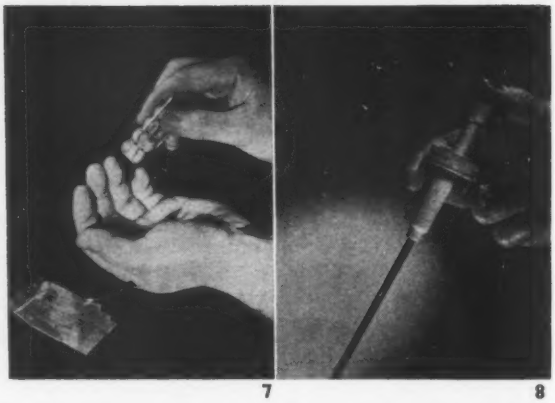


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7 8

7. Transparent pill box with dispensing feature is injection molded of high acetyl cellulose acetate. Photo Monsanto. 8. Pump type sprayer closure molded of vinyl.

odorless, resistant to organic solvents and have little or no tendency to pick up dirt even with constant handling. They are widely used for tube and bottle caps in colors that harmonize with labels in pastel colors.

Containers

Molded containers are important in the "fancy" packaging of jewelry, cosmetics and many other products of a more-or-less luxury nature. Usually the molded plastic container forms a permanent keeping place for a product that has a long re-use life; such a container often has a hinged lid, and the hinge itself may be of matching plastic. Molding gives free rein to the designer in the way of shape and decoration. All the visual and sensory qualities of plastics are used to good advantage in molded containers—color, visibility, lustre and smooth surface texture—as well as the physical qualities of long life and light weight. Among the popular materials are the phenolics and ureas, for opaque containers, and the thermoplastics such as cellulose derivatives, polystyrene and acrylics—especially where transparency is desired.

Sheet plastics, usually transparent, are used for drawn and set-up containers. Cylindrical, rectangular or odd-shaped containers may be obtained by either process, but the drawn containers, being seamless, usually are desirable where siftproofness is desired. An important consideration is the gauge of sheet needed to provide the rigidity desired in the container; such containers may be only semi-rigid, or they may be so sturdy as to be comparable in this respect to the molded forms. Transparency is, of course, nearly always the primary reason for using containers made of transparent sheet, but the question whether full visibility will strengthen sales appeal or whether the product could better be pictured in end-use on the exterior of an opaque container, must be considered.

There is a distinct re-use value in transparent containers. This was apparent before the war. Housewives who use them will be able to tell instantly just where any particular item may be found. Thus, they may find wide popularity in conversion to use as canisters in kitchens, hat boxes, jewelry and belt boxes, shoe boxes, etc. Where short-life products—such as confections, fancy bakery products, toilet articles, etc.—are packed in transparent containers, the containers usually are saved to become permanent storage boxes.

In the field of sampling, rigid transparent vials and jars are widely used because of their superior resistance to breakage, their visibility and light shipping weight.

Rigid transparent containers have some physical limitations. Hygroscopic products cannot always be packed in them, because some of the materials from which they are made are moisture-permeable. Other products which contain moisture which must be retained are usually excluded from the use of this type of package, unless some additional form of moisture-retaining protection is provided. Transparent containers generally must be handled with care to prevent scratching and chafing.

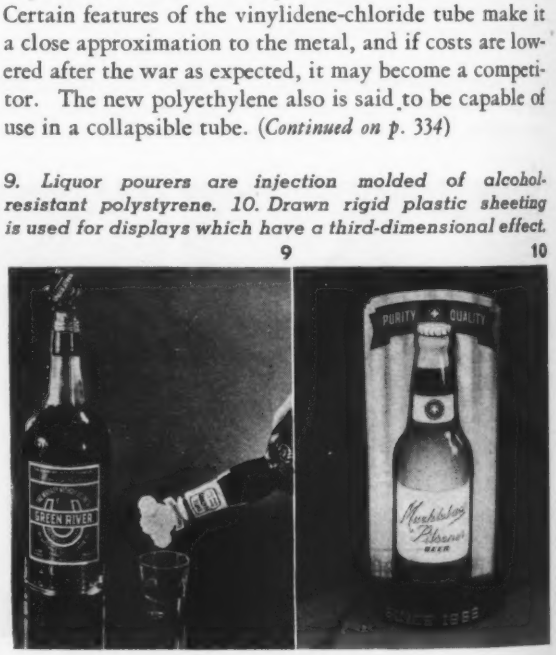
The bulk of transparent containers made from sheet have used cellulose acetate, ethyl cellulose or vinyl sheeting. These materials are supplied to manufacturers in sheets or in continuous-length rolls, and are available in many gauges. (See table, p. 333.) Standard gauges and roll sizes and lengths are most economical for short-run work; for volume production it may be advisable to buy cut-to-size pieces from the material supplier.

Surfaces of most plastic sheetings can readily be printed. Special penetrating inks permit speedy production.

Extruded containers are principally lipstick holders, inhalants and other small, tubular package forms, either rigid or non-rigid. During the war, one collapsible toothpaste tube, extruded of a cellulose-acetate compound, has been used as a substitute for metal. It is said by its users to have certain disadvantages, and its postwar position is uncertain. Worthy of postwar attention is a similar tube using vinylidene chloride, which has been fully developed and tested but not marketed during the war because of military demands for the material. Certain features of the vinylidene-chloride tube make it a close approximation to the metal, and if costs are lowered after the war as expected, it may become a competitor. The new polyethylene also is said to be capable of use in a collapsible tube. (*Continued on p. 334*)

9. Liquor pourers are injection molded of alcohol-resistant polystyrene. 10. Drawn rigid plastic sheeting is used for displays which have a third-dimensional effect.

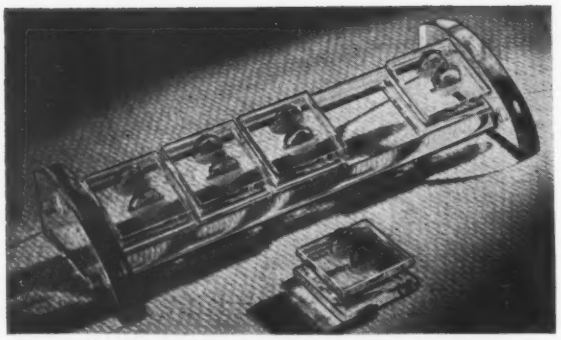
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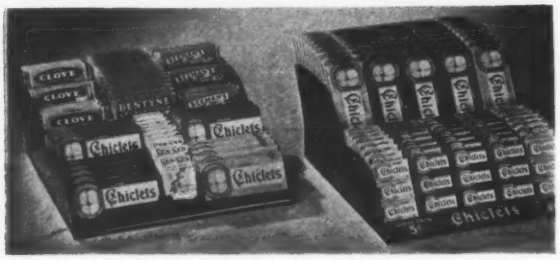
PROPERTIES OF PLASTIC SHEETING USED FOR RIGID CONTAINERS*

Properties	*Vinylite*	*Ethocel*	*Eastman Acetate Regular*	*Eastman Acetate Rigid*	*Lumarith*	*Vuepak*
GENERAL INFORMATION						
Manufacturer	Carbide and Carbon Chemicals Corp., New York, N. Y.	Dow Chemical Co. Midland, Mich.	Eastman Kodak Co., Rochester, N. Y.	Eastman Kodak Co., Rochester, N. Y.	Celanese Celluloid Corp., New York, N. Y.	Monsanto Chemical Co., Plastics Div., Springfield, Mass.
Chemical type	Vinyl chloride-acetate resin	Ethylcellulose	Cellulose acetate	Cellulose acetate	Cellulose acetate	Cellulose acetate
Forms available	Sheets 50 by 20 in.	Sheets and continuous rolls	Clear and translucent sheets	Clear sheets only	Sheets and continuous rolls	Sheets and continuous rolls
Thickness range, in.	.005 to .250 by .005 steps	.003 to .020	.003 to .020	.003 to .020	.003 to .020	.005 to .020
Area factor for .005-in. gage, sq.in. per lb.	4,000	4,800	4,250	4,150	4,100–4,200	4,189
Maximum width of continuous rolls, in.	....	25	40	40	42	32
Specific gravity at 25° C.	1.33–1.45	1.14	1.28	1.31	1.32–1.30	1.25–1.30
MECHANICAL PROPERTIES						
Tensile strength, lb. per sq. in.	8,000–10,000	10,000	7,500–11,000	6,800–11,500	6,500–11,000	7,000–11,000
Elongation, %	5	30–40	30–40	26–32	25–40	25–50
Bursting strength (Mullens test), lb. per sq. in.	..	112 for 0.003-in. gage	90 for .003-in. gage	90 for .003-in. gage	290 for 0.010-in. gage	150–350
Tearing strength (Elmendorf), grams per mil	5.6	.....	.....	.....	16.5	11–26
Folding endurance (M. I. T.), cycles	...	40–150 for 0.020 to 0.003-in. gage	8–45 for .010 to .003-in. gage	8–45 for .010 to .003-in. gage	10 for .010-in. gage	8–56 for 0.010 to 0.003-in. gage
THERMAL PROPERTIES						
Coefficient of expansion, 10^{-5} per ° F.	3.9 (32° to 120° F.)	6 (15° to 110° F.)	5.1	6.0	6–9	5.6–8.9
Thermal conductivity, 10^{-4} cal. per sec. cm. ° C.	3.7	5.6	...	...	4.5–7.8	4.5–7.8
Heat distortion point, ° F.	135–155	130–220	...	...	.....	130–212
Forming temperature, ° F.	195–265	0–275	225	250	225–275	225–275
CHEMICAL PROPERTIES						
Water absorption, % in 24-hr. immersion at 25° C.	0.05–0.15	3.0	4.9	5.2	4	1.5–3.0
Dimensional change after 24-hr. immersion in water, %	0.05 (6 weeks)	1.0	1.4–1.7	1.2–1.4	0.75–1.0	0.8
Loss in weight after 24-hr. immersion in water, %	None	None	.....	.....	0.15	Nil to 0.2
Water-vapor permeability (0% to 100% R. H.) g./m.²/24 hr.	30 @ 30° C. for 1 mil film	200 @ 30° C. for 0.010-in. gage	110–160 @ 40.5° C. for .010 to .003-in. gage (0% to 90% R. H.)	110–160 @ 40.5° C. for .010 to .003-in. gage (0% to 90% R. H.)	75 @ 25° C. for .010-in. gage	50–145 @ 25° C.
Resistance to weak acids	Excellent	Excellent	Gradual hydrolysis	Gradual hydrolysis	Fair	Fair
Resistance to strong acids	Excellent	Decomposes	Decomposes	Decomposes	Decomposes	Decomposes
Resistance to weak alkalies	Excellent	Excellent	Gradual hydrolysis	Gradual hydrolysis	Fair	Slight attack
Resistance to strong alkalies	Excellent	Excellent	Decomposes	Decomposes	Decomposes	Decomposes
Resistance to greases and oils	Excellent	Excellent	Excellent	Excellent	Depends on type	Varies with type of grease or oil
Resistance to organic solvents	Resistant to alcohols; soluble in ketones and esters; swells in aromatic hydrocarbons	Soluble in most common solvents	Softens in alcohols; soluble in ketones and esters; insoluble in hydrocarbons	Softens in alcohols; soluble in ketones and ester; insoluble in hydrocarbons	.....	Softens in alcohols; soluble in ketones and esters; insoluble in hydrocarbons.
PERMANENCE PROPERTIES						
Resistance to light under indoor conditions	Slight yellowing after prolonged exposure	Excellent	Good	Good	Good	Good
Resistance to low temperatures	Flexibility decreases	Excellent at —50° F.	Good	Good	Satisfactory	Satisfactory at 32° F.
Resistance to high relative humidity	Excellent	Slight swelling	0.2 to 0.4 per cent expansion	20% to 70% R. H.	Swells	Swells
Flammability classification	Non-flammable	Slow burning	Slow burning	Non-flammable	Slow burning	Slow burning

* From manufacturers' figures and data.



10



11

10. Ring holders fabricated of clear methacrylate sheet.
11. Chewing-gum dispensing displays molded of phenolic.

Cellulose-derivative containers in the form of vials and tubes are manufactured by several companies using a special process. They are used primarily as containers for dry or metal products, pills, tablets, some semi-liquids and petroleum products. They are lightweight and strong, and can be integrally printed with multi-color trademarks, designs, etc. They may be made translucent, transparent or opaque and in a wide range of colors. They can be threaded to take a screw cap. They can be quite small, but are limited in size to about 6 in. in length and 1 in. in diameter.

Displays

Improvements in both materials and manufacturing methods will direct renewed attention after the war to plastics in the display field—a field in which they are drastically limited for the duration.

Cast and molded plastics are used in high-class displays for their attention-arresting qualities of transparency and color. For the more elaborate displays and fixtures which are used only in small quantities, the machinable plastics, such as the cast resins and methacrylates, are well adapted. When substantial quantities are needed, the molded materials—including ureas, phenolics, methacrylates and polystyrenes—offer design possibilities and production economies.

Long life of the plastic display piece should be considered. Such pieces as wall fixtures, back-bar displays and window fixtures need only an occasional dusting to keep them in use for many years. The translucent and transparent plastics—particularly the acrylics and polystyrenes which have the ability to "pipe" light—are increasingly used in conjunction with lighting mechanisms in which limitless ingenious effects can be achieved. When molding is utilized, it is possible, in a single operation, to fabricate a complete unit including parts and compartments which—in any other material—would require a number of fabricating steps.

Displays fabricated and drawn from sheet plastics may be roughly grouped in three classifications:

Dispenser displays combine the functions of merchandise container and display piece, and have been most widely used in the confectionery field. Used for candies and gum ranging in retail price from one to 10 cents, the display pieces are designed for a prominent spot on the retail counter, preferably near the cash register where they can stimulate impulse buying. Products other than candies which have successfully used this type are varied and include automobile fuses, packaged asperin, etc.

Product displays, more pretentious in nature, are widely used for merchandise for which point-of-sale display is necessary but which also need protection from handling or pilfering. The cosmetics and perfume industry has made especially effective use of this type as a counter unit, sometimes showing the entire line or a family of products. Some of the finest display boxes of this type are used by jewelers. The adaptability of plastic to surfaces with compound curvatures has broadened the scope of design in such permanent displays; concave curved fronts may successfully kill highlights and reflections which are so objectionable in flat glass fronts. A prewar trend was towards displays with metal or wood bases and convex-domed transparent surfaces. Electrical illumination has been cleverly incorporated into many of these units. The brand name and selling message are often printed on the transparent surface

Attention displays are used primarily to gain attention for a product or for display of a trade name and pictorial rendition of a product. The distilling trade has been especially alert to this trend, with a number of displays introduced just before the war for beers, wines and liquors. Notable is a process developed for printing up to seven colors on transparent acetate sheet plastic which can then be drawn or formed to such shapes as relief bottles, globes or trademark insignia without distortion of the printed decoration and legend. Most displays using this technique incorporate electric illumination.

12. Pipe display case with cover of rigid vinyl sheet is typical of use of transparent plastic in product display.

12



Values for properties in this chart are based on figures submitted by a number of manufacturers. Differences in test procedures and sizes of specimens may lead to erroneous conclusions if direct comparisons are attempted. Special grades of materials often excel in one particular property.

PROPERTIES OF MOLD

USED IN P

PROPERTIES	PHENOL-FORMALDEHYDE COMPOUNDS			PHENOL-FURFURAL COMPOUNDS	UREA-FORMALDE-HYDE COMPOUND	MELAMINE-FORMALDE-HYDE COMPOUND	VINYL ACETAT
	Molding		Cast				
	No Filler	Woodflour Filler	No Filler	Woodflour Filler	Alpha Cellulose Filler	Alpha Cellulose Filler	Rigid
Molding Qualities	Fair	Excellent	—	Excellent	Excellent	Excellent	Excellent
Compression Molding Temp., ° F.	300–340	280–360	—	330–400	290–325	280–340	280–325
Compression Molding Pressure, lbs. per sq. inch	2000–5000	2000–4500	—	1000–4000	1500–6000	1500–6000	1500–2000
Injection Molding Temp., ° F.	—	275–375	—	250–375	—	—	280–300
Injection Molding Pressure, lbs. per sq. inch	—	2000–10000	—	300–10000	—	—	18000–3000
Compression Ratio	2.0–2.6	2.2–3.0	—	2.2–3.0	2.5–3.0	2.0–2.7	2
Mold Shrinkage, inch per inch	0.009–0.011	0.006–0.010	—	0.005–0.009	0.006–0.011	0.008–0.015	0.001 Max.
Specific Gravity	1.28	1.25–1.40	1.30–1.32	1.3–1.4	1.45–1.50	1.45–1.55	1.34–1.37
Specific Volume, cubic inch per lb.	21.7	22.2–19.8	21.3–20.0	21.3–19.8	19.1–18.5	19.1–17.8	20.7–20.2
Refractive Index, nD	1.5–1.7	—	1.59–1.61	—	1.54–1.56	—	1.53
Tensile Strength, lbs. per sq. inch	7000–12000	5000–8000	8500–10000	5000–8500	5500–7000	—	8000–10000
Elongation, percent	1.1	0.6	—	—	—	—	—
Modulus of Elasticity in Tension, lbs. per sq. inch $\times 10^5$	7–10	10–15	4	10–25	12–15	—	3.5–4.1
Compressive Strength, lbs. per sq. inch	10000–30000	16000–36000	20000–25000	28000–36000	24000	—	—
Flexural Strength, lbs. per sq. inch	12000–17000	8000–15000	10000–12000	8000–15000	10000–13000	10000–16000	12000–14000
Impact Strength, ft. lbs. per in. of notch $\frac{1}{2} \times \frac{1}{2}$ in. notched bar, Izod test	0.23–0.40	0.20–0.40	0.5–0.6	0.26–0.40	0.28–0.32	0.24–0.35	0.4–1.2
Hardness, Brinell No. (2.5 mm. ball, 25 kg. load)	—	30–45	—	35–40 (50 kg.)	48–54 (500 kg., 10 mm.)	—	12–15
Hardness, Rockwell	M80–M130	M100–M125	M65–M80	B65–B75	M110–M130	—	—
Thermal Conductivity, 10^{-4} cal. per sec. per sq. cm./1° C. per cm.	3–6	4–12	3–5	3.5–5	7.1		4.0
Specific Heat, cal. per ° C. per gram	0.3–0.4	0.35–0.36	0.3–0.4	0.3–0.4	0.4	—	0.24
Thermal Expansion, 10^{-5} per ° C.	2.5–6.0	3.5–7.0	8–11	3	2.5–3.0	—	6.9
Resistance to Heat, ° F. (continuous)	250	250	160	250	170	210	130
Softening Point, ° F.	None	None	—	Chars 450	None	None	140–150
Distortion under Heat, ° F.	240–260	240–285	113–176	270–290	260–280	385	140–150
Water Absorption, 24 hrs., %	0.1–0.2	0.2–0.6	0.4–0.6	0.2–0.6	1–3	1.0–1.7	0.05–0.15
Burning Rate	Very low	Very low	Very low	Very low	Very low	Nil	Nil
Effect of Age	None	None	Hardens slightly	Hardens slightly	Hardens slightly	None	None
Effect of Sunlight	Surface darkens slightly	Light shades discolor	Colors may fade	Light shades discolor	None	Slight color change	Darkens on prolonged intense exposur
Effect of Weak Acids	None to slight depending on acid			None to slight depending on acid	←	None	None
Effect of Strong Acids	Decomposed by oxidizing acids; reducing and organic acids none to slight effect			Decomposed by oxidizing acids; reducing and organic acids no effect	Decomposed or surface attacked	Decomposes	None
Effect of Weak Alkalies	Slight	Slight to marked depending on alkalinity		Slight to marked depending on alkalinity	←	None	None
Effect of Strong Alkalies	Decomposes	Decomposes	Decomposes	Decomposes	Decomposes	Attacked	None
Effect of Organic Solvents	None	None on bleed-proof materials	Attacked by some	None on bleed-proof materials	←	None	Resists alcoh drocarbons, in ketones a in aromatic h
Effect on Metal Inserts	Inert	Inert	Inert	Inert	Inert	Inert	Inert
Machining Qualities	Fair	Fair to good	Excellent	Fair to good	Fair	Fair	Good
Clarity	Transparent translucent	Opaque	Transparent translucent opaque	Opaque	Translucent opaque	Translucent	Transparent to opaque
Color Possibilities	Dark colors	Limited	Unlimited	Limited	Unlimited; pastel shades	Unlimited	Unlimited

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IES OF MOLDED AND CAST PLASTICS USED IN PACKAGING

The manufacturers should material. In order to fa these materials, the names chemical types of plastics

DE- ND	MELAMINE-FORMALDEHYDE COMPOUND	VINYL CHLORIDE ACETATE RESINS		VINYLIDENE CHLORIDE RESINS (Molding)	METHYL METHACRYLATE RESIN		POLYSTYRENE	C	
llu- ler	Alpha Cellulose Filler	Rigid	Flexible Unfilled		Cast	Molding		Ethyl-cellulose	Cellulose Sheet
nt	Excellent	Excellent	Good	Excellent	Good	Excellent	Excellent	Excellent	Excellent
5	280–340	280–325	250–340	220–350	—	280–370	275–350	250–360	210–320
00	1500–6000	1500–2000	500–1000	500–5000	—	1000–3000	1000–5000	500–5000	500–5000
	—	280–300	250–340	300–400	—	325–500	375–500	350–460	—
	—	18000–30000	18000–30000	10000–30000	—	10000–30000	10000–30000	3000–30000	—
0	2.0–2.7	2	—	2	—	1.6–2.2	2.0–2.3	2.2–2.5	—
011	0.008–0.015	0.001 Max.	0.02–0.10 (Varies with plasticizer)	0.005–0.015	—	Compression 0.001–0.005 Injection 0.003–0.006	Compression 0.002–0.005 Injection 0.002–0.008	0.001–0.011	Positive and 0.0
50	1.45–1.55	1.34–1.37	1.2–1.6	1.65–1.75	1.18–1.20	1.16–1.20	1.054–1.070	1.07–1.18	1.27–1.37
5	19.1–17.8	20.7–20.2	23.0–17.3	16.8–15.8	23.4–23.0	23.8–23.0	26.3–25.9	25.7–23.4	21.8–20.2
56	—	1.53	—	1.60–1.63	1.49–1.50	1.49–1.51	1.59	1.470	1.49–1.50
00	—	8000–10000	1000–9000	4000–7000	6000–10000	4000–7000	5000–9000	2000–9000	4000–14000
	—	—	Up to 500	10–40	1–15	1–15	2–5	5–40	20–55
	—	3.5–4.1	—	0.7–2.0	3–5	3–5	1.7–4.7	1–3.5	1–3.5
	—	—	—	7500–8500	11000–13000	10000–15000	11500–15000	8000–20000	4000–30000
000	10000–16000	12000–14000	(Varies with plasticizer)	15000–17000	10000–15000	10000–15000	8000–19000	3000–12000	4000–10000
2	0.24–0.35	0.4–1.2		0.3–1.0	0.2–0.4	0.2–0.6	0.3–0.5	0.6–8.0	1.5–4.0
mm.)	—	12–15	—	—	18–20	18–20	20–30	4.0–8.5 (10 kg.)	6–11 (10 kg.)
130	—	—	—	M50–M65	M65–M85	M60–M90	M75–M90	M25–M65	M25–M55
		4.0	3.9–4.0	2.2	4–6	4–6	1.9	3.8–6.3	4.5–7.8
	—	0.24	0.30–0.50	0.32	0.35	0.35	0.32	0.32–0.46	0.3–0.4
0	—	6.9	7–25	19	8	8–9	6–8	10–14	8–16
	210	130	150	160–200	140–160	120–160	150–190	140–200	140–220
	None	140–150	—	240–280	150–255	150–230	190–250	200–260	140–230
0	385	140–150	—	150–180	155	125–165	170–175	120–200	100–212
	1.0–1.7	0.05–0.15	—	<0.1	0.4	0.4–0.5	0.00–0.05	1.0–2.0	2.0–4.0
w	Nil	Nil	(Varies with plasticizer)	None	Slow	Slow	Slow	Slow	Slow
s y	None	None	None	Slight	Practically nil	Practically nil	Practically nil	Slight	Slight
	Slight color change	Darkens on prolonged intense exposure	Slight fading	Slight	Very slight	Very slight	Yellows slightly	Slight	Slight
	None	None	None	None	Practically nil	Practically nil	None	Slight	Slight
sed ce d	Decomposes	None	None to slight	Highly resistant	Affected only by oxidizing acids		Attacked by oxidizing acids	Decomposes	Decomposes
	None	None	None	Resistant	Practically nil	Practically nil	None	None	Slight
es	Attacked	None	None to slight	Resistant	Practically nil	Practically nil	None	Slight	Decomposes
	None	Resists alcohols, aliphatic hydrocarbons, and oils. Soluble in ketones and esters; swells in aromatic hydrocarbons		Resistant	Soluble in ketones, esters and aromatic hydrocarbons		Soluble in aromatic and chlorinated hydrocarbons	Widely soluble	Soluble in
	Inert	Inert	Inert	Inert	Inert	Inert	Inert	Inert	Inert
	Fair	Good	—	Good	Fair to excellent	Excellent	Fair to good	Good	Good
nt	Translucent	Transparent to opaque	Transparent to opaque	Translucent to opaque	Transparent (90–92% light transmission)		Transparent (88–92% light transmission)	Transparent translucent opaque	Transparent translucent opaque
d; des	Unlimited	Unlimited	Unlimited	Extensive	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited

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urers should always be consulted before making a choice of order to facilitate communications with the producers of s, the names and addresses of manufacturers of each of these s of plastics are listed in the Directory Section.

CELLULOSE COMPOUNDS

Cellulose Acetate		Cellulose Acetate, High Acetyl	Cellulose Acetate Butyrate	Cellulose Nitrate (Pyroxylin)
Sheet	Molding			
Excellent	Excellent	Excellent	Excellent	Good
210–320	260–390	260–390	260–370	185–250
500–5000	500–5000	500–5000	2000–5000	2000–5000
—	340–500	340–500	340–420	—
—	3000–30000	3000–30000	3000–30000	—
—	2–2.8	2.0–2.8	2.0–2.8	—
Positive and injection 0.002–0.003; Semipositive 0.005–0.007; Flash 0.008–0.009				—
1.27–1.37	1.27–1.37	1.27	1.14–1.22	1.35–1.40
21.8–20.2	21.8–20.2	21.8	24.3–22.8	20.5–19.8
1.49–1.50	1.46–1.50	1.47	1.47–1.49	1.50
4000–14000	3000–10000	3000–8000	2500–6700	5000–12000
20–55	8–80	4–45	40–80	10–60
1–3.5	0.6–3.5	1.0–3.5	0.6–2.0	2–4
4000–30000	5000–30000	5000–30000	7500–22000	20000–30000
4000–10000	1500–12000	1500–12000	2000–13000	8000–10000
1.5–4.0	0.7–6.0	0.7–6.0	0.8–7.9	2.0–8.0
6–11 (10 kg.)	5–11 (10 kg.)	6–11 (10 kg.)	6–12	8–11 (10 kg.)
M25–M55	M25–M80	M25–M80	M25–M69	M25–M60
4.5–7.8	4.5–7.8	5	4.5–7.8	3.1–5.1
0.3–0.4	0.3–0.4	0.37–0.42	0.3–0.4	0.34–0.38
8–16	8–16	10–15	11–16	6–16
140–220	140–220	150–220	140–220	ca. 140
140–230	145–260	145–260	140–250	160–195
100–212	105–215	130–212	115–215	120–165
2.0–4.0	2.5–4.0	1.5–2.9	1.6–2.1	0.6–2.3
Slow	Slow	Slow	Slow	Very high
Slight	Slight	Slight	Slight	Slight hardening
Slight	Slight	Slight	Slight	Discolors and becomes brittle
Slight	Slight	Slight	Slight	Slight
Decomposes	Decomposes	Decomposes	Decomposes	Decomposes
Slight	Slight	Slight	Slight	Slight
Decomposes	Decomposes	Decomposes	Decomposes	Decomposes
Soluble in ketones and esters; softened or slightly soluble in alcohol; little affected by hydrocarbons				
Inert	Inert	Inert	Inert	—
Good	Good	Good	Good	Good
Transparent translucent opaque	Transparent translucent opaque	Transparent translucent opaque	Transparent translucent opaque	Transparent translucent opaque
Unlimited	Unlimited	Unlimited	Unlimited	Unlimited

Design & manufacturing considerations



1. All these urea and phenolic closures came from stock molds, but individuality has been obtained. Photo Durez.

The problem of mold construction is an important consideration in the economics of plastic applications. Molds are expensive, initially, because for any type of high-pressure work they must be hand-made, by highly skilled and highly paid workmen, of very costly tool steel. Amortization of mold cost definitely has a very important bearing on the price of a package.

However, well-made, heat-treated steel molds will stand up for hundreds of thousands of molding cycles. If two, three, four or more pieces are molded simultaneously in a multiple-cavity mold, the mold cost is reduced proportionately. Actually, it is not unusual to find a large compression mold for closures having 200 or more cavities. Mold cost per piece can only be arrived at by dividing cost of the mold by the total number of pieces it is expected to produce.

Stock molds

An important mitigating factor in the cost of molds is the availability of stock molds. There are few users of plastic closures or molded containers, however large, who will not find it advisable at times to make use of existing molds, sharing the cost with hundreds of other users.

Virtually all molders have a number of stock molds on hand from which they will sell customers any reasonable quantity of parts. Furthermore, many large custom molders will not even have to set up a mold to run off a small lot of a standard item, but will have this item in stock, ready to ship, in the most-wanted sizes and colors. Thus, in many cases manufacture does not have to be considered at all. The stock-mold practice is very similar to that which prevails in the glass industry.

The use of stock molds has taken on added importance during the war, when, because of manpower and material shortages, it was often impossible to manufacture custom molds. The existing stock of molds* covers almost every conceivable type of package and package part.

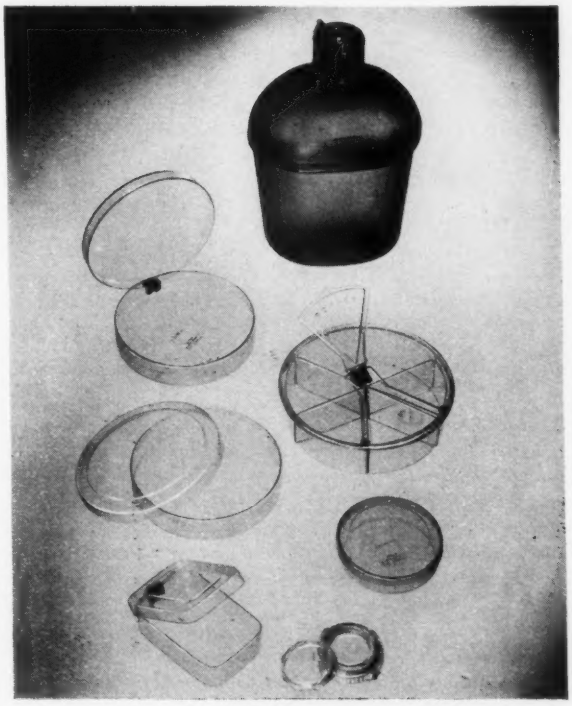
Use of stock molds does not necessarily preclude brand identification or individual characteristics on the finished item. If the run is long enough, the molder will be glad to adapt the stock mold with a brand name or design, and for short runs the finished molding may be branded or marked by one-of several available processes.

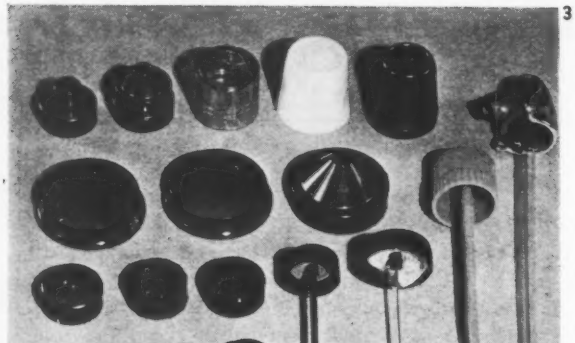
Trade names or trademarks may be incorporated in the molded part at slight extra cost. Special steel inserts, engraved with the particular wording or design desired, are inserted in a section of the mold designed particularly to receive this "plug."

A method has been worked out through which it is possible to print in as many as four colors on plastic

* Modern Plastics magazine, 122 E. 42nd St., New York City, maintains a stock mold service to help buyers locate mold owners.

2. Illustrating types of molded transparent containers. that are readily obtainable from stock molds in existence.







containers with little expense. An over-all pattern against a plain ground will change a stock container from a drab to a colorful one and give it individuality.

Another advantage to the packager who is in a position to choose a design from a stock mold is prompt delivery. To make a mold of steel, grinding and tooling it into shape and hobbing in special designs, takes weeks or months even in normal times. But the packager who finds a mold in stock has only to wait for a chance to get the mold in a press and production begins at once.

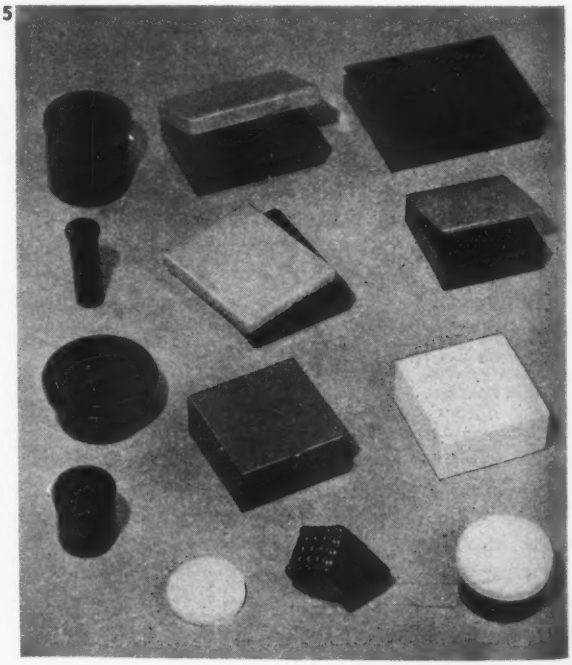
Furthermore, he has the opportunity of seeing exactly what kind of closure or container will be delivered to him. Samples are almost always available, and the packager can look them over, choose one that meets his requirements and order a hundred for test purposes.

In ordering from stock molds, the packager is, of course, not limited to the particular plastic material and color previously used in the mold. Within certain limitations, he can specify the exact material and color which will best suit his product.

Design

If the plastic package or part is to be custom made, the first consideration is design. Here the advice of a good designer and/or molder should be followed, but the packager will do well to keep certain fundamentals of design in mind.

If an article requires strength throughout, there are several methods of securing it. Dome or hemispherical shapes are stronger than flat-topped ones. Fillets at corners or filleted ribs are advisable. Extra thickness of material at points of stress may be obtained by beading or reinforcing ribs. Attachment or assembly inserts should be in filleted bosses if at all possible; this helps to keep "flow marks" from the molding operation where



3. Closures which can be fabricated from stock molds are not limited to plain threaded caps. Stock molds include many fancy closures as well as a variety of sprinklers, dispenser tops, shaker caps, jiggers, applicators etc., as illustrated here. 4. and 5. Stock molds make containers, both utilitarian and decorative, which are suitable for a wide range of products and for many types of sales presentation. The packager who uses stock molds is not limited to the plastic material or to the color which has previously been used in that mold. He can choose the combination best suited to his product.

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they show least. Shapes that call for loose sections in a mold to obtain undercuts should be avoided if possible for economical molding. Small side holes often can be drilled. Ribbing and stippling can hide "flow marks."

Threads can be molded into round parts and, by means of loose mold sections, into other shapes. In so doing, the wall thickness should be figured from the inside of the thread instead of over-all. Very sharp edges may be obtained, but are generally inadvisable from the handling standpoint and it is best to "break" corners slightly. Stippled effects and sharp-edge lettering sometimes cause sticking in the molding operation. Fine, straight-draw ribbing and round-edge lettering will help eliminate this.

Incised lettering and design in plastics mean higher die cost than raised lettering. When incised lettering is desired, it is best to employ a narrow style if such lettering is to be wiped in. Double- or triple-line lettering is better for wider letters because there is less likelihood of the pigment being wiped or worn off. "Low" bas-relief designs and letters catch highlights as well as do high-relief decoration, yet they are more easily kept clean.

Relief and intaglio sculpturing, inlays of metal or other contrasting materials, decals, labels and branding are the most commonly used methods of decorating plastics. Leather (real or imitation), wood, rope, canvas, cloisonné, printed papers, cork, laminated materials, glass reed and fabrics all can be combined with plastics.

The use of applied decoration has contributed not only to the versatility of plastics as a medium for packaging and for achieving sales appeal, utility and beauty, but it likewise has provided, on occasion, a means of reducing packaging costs, since such applied decorations usually are less expensive on short runs than decorations formed by the mold itself.

Finishing operations

When a plastic article has been ejected from the mold it need not necessarily be complete. Small pieces may be tumbled to give them a smoother finish and remove the rough edges. Others may be drilled or tapped. One plastic piece may be glued to another piece with a solvent or adhesive. Plastic moldings can be machined on ordinary wood- and metal-working machinery.

A number of supplementary operations may be desirable, depending upon the design. If the product is a box, hinges and locks of various types may be added; these may be attached by screws, rivets or self-tapping screws. A very widely used type of hinge consists of a spring which locks into recesses provided for this purpose in the base and cover of the molded article. The use of this type of hinge requires pre-planning, since the cover pivots upon a groove in the molded base. The spring's function principally is to hold the cover into this groove and control opening and closing. Proper planning of the groove and hinge construction can predetermine the angle of greatest opening.

6



6. *Rigid plastic sheeting may be fabricated or drawn into many types of containers, standard and irregular in shape. Drawing, P. P. Kellogg & Co. Division, U. S. Envelope Co.*

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DOWN TO THE DOTTED LINE WE'RE JUST LIKE EVERYONE

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LUSTEROID CONTAINER CO., INC.

FORMERLY LUSTEROID DIVISION OF SILLCOCKS-MILLER COMPANY

OFFICE AND FACTORY: 10 W. PAR[illegible] AVENUE, MAPLEWOOD, N. J. MAILING ADDRESS: SOUTH ORA[illegible]GE, N. J.

XUM

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Out of the elements of Water, Earth and Air



Man's mind and hand have created a material world all his own. Plastics are not compounded by Nature, but, more truly than any other substance, are man-made and man-conceived, with a future limited only by the energy, imagination and courage brought to bear on their development.

We Americans have the vision and vitality of a free people. We have the precedent of vast industrial achievement; and from the urgent necessity of production for war we have evolved new ideas, new methods, new materials to meet the Future's inevitable demand for better things. Post-War Plastics promise infinite possibilities.

Here at Colt's our plans are made, ready to mature into reality when the time arrives. We recommend looking ahead as a prudent and profitable occupation.

THE PLASTICS DIVISION

Established 1922

COLT'S PATENT FIRE ARMS MFG. CO.

HARTFORD *Founded 1836* CONNECTICUT

A COMPLETE SERVICE

Chemical .....

Art and Design .....

Engineering .....

Our Own Tool and Mold-Making Department .....

An outstanding Processing Organization.

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Clearsite resilience makes Clearsite shatterproof, and offers a finger-pressure dispensing feature of value in many commodities.

(A) Collapsible tubes for ointments, salves, etc.

(B) Large sized containers with thick or thin walls as required by contents.

(C) Hardware or metallic merchandise, jewel bearings or machine parts.

(D) Hygienic or sanitary items protected against handling when displayed.

(E) For dispensing powders, etc., by fingertip pressure, like a bellows.

(F) Samples for distributors, transparent for grading or comparison of color.

(G) Packet or purse products (shatterproof) featherlite and less bulky.

OPAQUE OR TRANSPARENT

COLORFUL

LABELED IN PROCESS OF MANUFACTURE

DRUGS • PHARMACEUTICALS • FIRST AIDS • DIETARY OR HYGIENIC PRODUCTS
INSTRUMENT & PRECISION PARTS • TOOLS • GEMS • VISCOUS OR GRANULAR PRODUCTS

Better Looking Containers with many Packaging Advantages . . .

Celluplastic containers possess many exclusive features with decided, distinctive selling advantages. Combining beauty, utility *and* convenience in use, no other containers approach the value available in

Clearsite

eye-appeal PLUS *shatterproof and seamless protection*

There is a size, a shape, and a *type* available for each of a hundred different kinds of merchandise or novelties, ALL of them lustrous, durable, featherlite. Ask for samples.

You can utilize the service of our Package Design Staff to incorporate greater sales-appeal with Celluplastic features!

CELLUPLASTIC CORPORATION

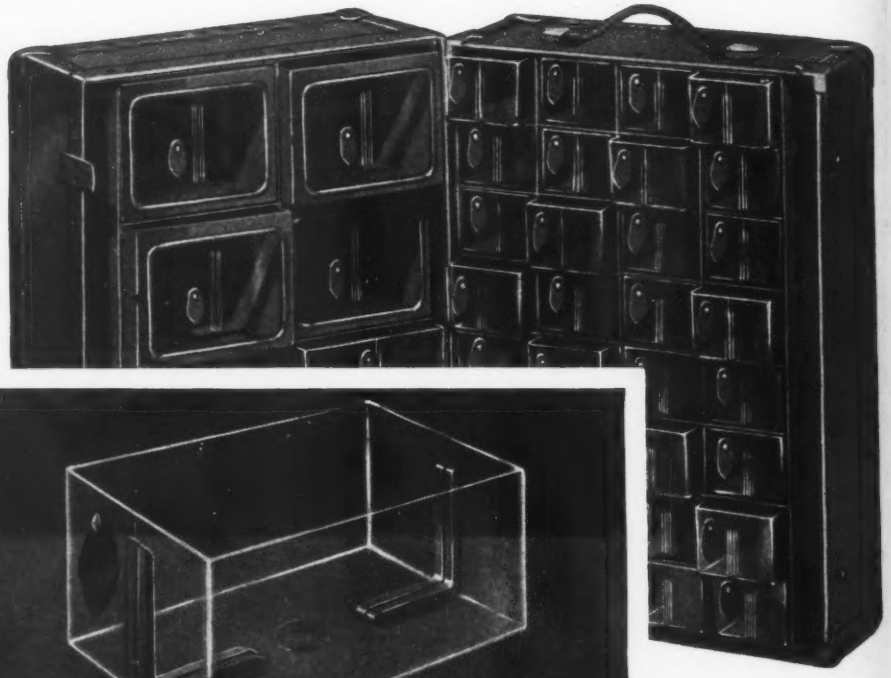
FIRST IN CELLUPLASTICS
HYCOLOID-CLEARSITE

60 AVENUE L NEWARK, N. J.

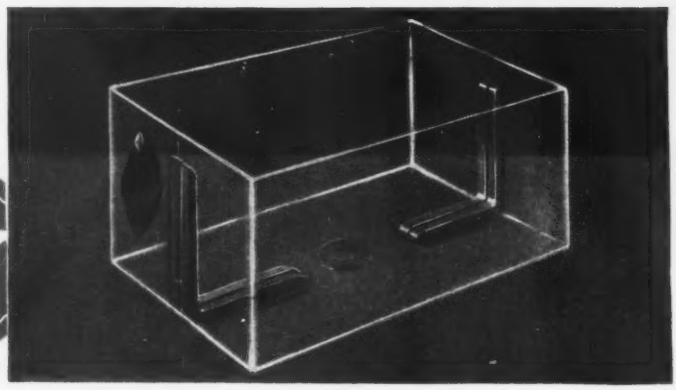
In War or Peace

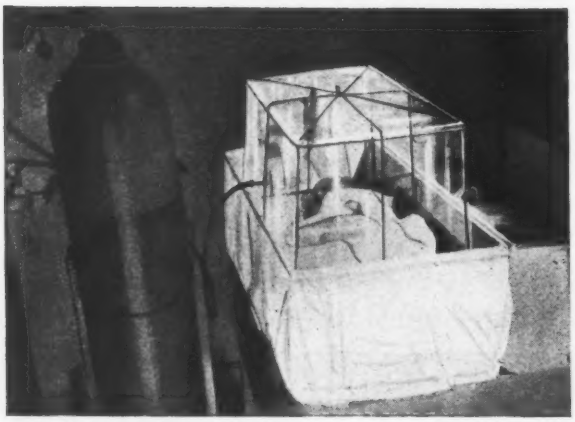
THE STANDARD





These transparent Lumarith boxes for the Air Corps repair kits are a far cry from the first rigid transparent hat box which gave Lumarith such fame some years ago. In this military application, the units are molded from Lumarith molding materials.







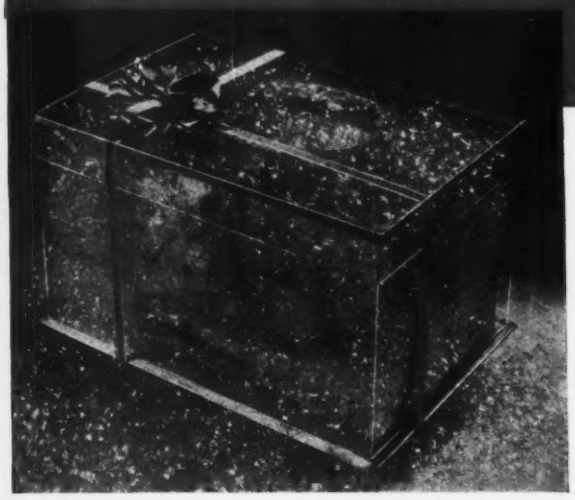
The food cover was the forerunner to this highly practical transparent oxygen tent. The use of rigid transparents in the medical field has received a great impetus due to war applications.

This light, strong package is molded from Lumarith.

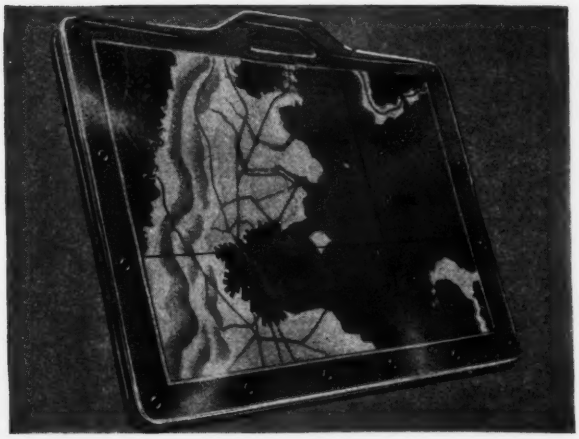
FOR PLASTIC PACKAGING

Lumarith*

A Celanese Plastic



The glamour of the rigid transparent package for such items as cosmetics was in itself so dramatic that little thought was given to the high degree of utility which this type of package furnished. Fundamentally, it was a short step from containers for this type of merchandise to military containers—and it's a short step back.



Rigid transparent envelopes have served so well in the war effort that the market for this type of package has quadrupled.



These two transparent packages are simultaneous twins. One is injection molded from Lumarith molding materials and the other is formed from Lumarith sheets. They are the containers for the paratrooper's first aid kit which is packed inside the frying pan he brings with him down from the skies.

Lumarith introduced the transparent rigid container. Since the days of the hat box and the shoe box, Lumarith sheets and molding materials in the complete range of colors have been consistently developed so that today the various Lumarith formulae can meet the most exacting specifications. . . . Celanese Celluloid Corporation, *The First Name in Plastics*, a division of Celanese Corporation of America, 180 Madison Avenue, New York City 16.

QUICK FACTS

MOLDING COMPOUNDS	LUSTRON Polystyrene	FIBESTOS Cellulose Acetate	RESINOX Phenol-Formaldehyde	MELAMINE Melamine-Formaldehyde
Specific Gravity	1.054 1.07	1.27 1.37	1.25 1.75	1.49
Compressive Strength, lbs. per sq. in.	11,500 15,000	6,000 30,000	20,000 35,000	30,000
Impact Strength, ft. lbs. per in. notch, Izod test	0.3 0.4	1.0 5.0	0.2 8.0	0.28 0.40
Color Range	unlimited	unlimited	limited to dark opaques	all shades—translucent to opaque
Dimensional Stability	excellent	fairly good	excellent	excellent
Acid Resistance	excellent	fair	fair	good
Alkali Resistance	excellent	fair	fair	excellent
Resistance to Organic Solvents	good	poor	excellent	excellent
Moisture Resistance	very good	fair	very good	excellent

NOTE: *Values given here, except where otherwise noted, are determined on samples conditioned and tested at 25°C (77°F.) and 50% R. H using standard A.S.T.M. methods. Since wide variations are possible in compounding specific formulations the values given represent a range while length of bar represents desirability of property. For example, although Lustron's specific gravity is the lowest of all these materials, the bar representing this property for Lustron is the longest since light weight is a desirable characteristic.*

NOTE: *All these values, and especially the ratings given for chemical resistance, are for qualitative study only. Resistance of a specific plastic to a specific chemical compound can only be determined by laboratory tests of the plastic and compound.*

ON THE BROAD AND VERSATILE FAMILY OF MONSANTO PLASTICS

SHEETS, RODS, TUBES

Three of the basic types of Monsanto Plastics are supplied in one or more of these forms: *Fibestos* cellulose acetate is available in sheets, rods or tubes with essentially the same properties as molded articles (see chart); these can be fabricated by mechanical means or shaped with slight heat and pressure, are widely used in specialty packages and displays . . . *Nitron* cellulose nitrate comes in sheets, rods and tubes which are characterized by a broad range of color, high lustre, good dimensional stability, toughness and strength; sensitiveness to heat, however, limits their usefulness to packagers . . . *Saflex* vinyl acetal sheets are supplied in continuous rolls chiefly for service as the interlayer in high test safety glass, but new, rubber-like formulations may help answer special packaging problems.

No businessman, looking forward to the postwar sales problems his postwar products will face, can afford to overlook the part which proper packaging can play in solving those problems . . . or the part plastics will play in postwar packaging. That's why it will pay to check thoroughly on a wide range of different plastics with *your* needs in mind.

Here is a good starting point for such a check.

Here are a few facts which will give you a quick picture of the big and varied family of Monsanto plastics, one of the largest and most versatile groups of synthetic materials offered by any one manufacturer. For a more complete picture, you will want the fact-packed, 24-page booklet, "The Family of Monsanto Plastics," prepared especially for product and package designers. Simply write: MONSANTO CHEMICAL COMPANY, Plastics Division, Springfield 2, Massachusetts.

VUEPAK

Most familiar of the big family of Monsanto plastics to the packaging industry is Vuepak, the rigid, transparent cellulose acetate sheeting which helped sell hundreds of prewar products from lawn seed to silverware, towels, shoes and even pretzels by letting prospects *see* the merchandise before they bought. Sleek and transparent, yet tough and rigid, it was known both for its sturdy strength and exceptional clarity. Now Vuepak is engaged exclusively in helping win the war, but out of the process of fitting Vuepak to new and exacting wartime jobs, Monsanto research has produced even tougher, stronger materials with equal or better transparency than the peacetime Vuepak you knew — a fact well worth noting when your plans for postwar packaging are discussed! . . . Vuepak thicknesses range from .005 to .02 inch in widths up to thirty inches. Sheets come any length.

SPECIAL RESINS

The Family of Monsanto Plastics includes a broad and varied group of resins of particular interest to packagers . . . *Saflex* vinyl acetal resins, characterized by low gas permeability and excellent oil resistance, which heat-seal to form strong bonds and can be applied from inexpensive, readily available alcohol solutions . . . *Resinox* phenolic resins of special interest as adhesives and as impregnants for paper to which they give greater strength plus resistance to chemicals, water, heat and oils . . . and *melamine* resins which share the same advantages as Resinox plus the further advantage of a virtually unlimited range of light-fast colors. Uses for all these resins are so specialized that little general information can be given. Each application calls for careful, individual study before the best resins for that particular purpose is specified.

VUEPAK
TRANSPARENT PACKAGING MATERIAL

MONSANTO
PLASTICS
SERVING INDUSTRY . . . WHICH SERVES MANKIND

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HERE COMES ANOTHER 20,000,000

WAR WORKERS!

Right off the presses, ready to perform their duty dependably and unflinchingly; a function as important as the front line. For without these closures, necessary foods would perish, vital drugs become contaminated, strategic chemicals assume impotency.

Yet, the value of molded closures does not end merely with utility. Tons of precious metals are routed to the war effort by the elimination of metal from cap and closure applications.

In the post-war era, we'll talk about the beauty, finish and lustre, too, of MACK molded closures. How their high quality, excellence of design and low cost are prime requisites in civilian marketing; how they reduce sales resistance.

Right now, though, we want to emphasize the part played by MACK closures — millions of them—in helping to win this war. Inquiries should be addressed to Mack Molding Company, 132 Main Street, Wayne, New Jersey.



Mack
MOLDED EXCELLENCE

SALES OFFICES: NEW YORK CITY, CHICAGO, DETROIT, INDIANAPOLIS, BOSTON & ST. LOUIS

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A SHORT GUIDE



TO BETTER PACKAGING

DOW

Abonirex

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Dow-developed protective solves the moisture problem

The question "What packaging film shall I use?" should be answered by the selection of that material which most nearly fits *all* specific needs. Tough, flexible Saran Film has been developed by The Dow Chemical Company as a transparent packaging medium of "balanced" characteristics. And it has the especially valuable ability to "keep moisture in its place" over unusually long periods. Whether moisture is to be kept out of the package or retained inside, Saran Film is provedly superior, even under the extremes of climatic conditions encountered in present-day global transportation activities. As time goes on, more and more packaging users and fabricators will avail themselves of the numerous features offered by Saran Film.

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HOW AND WHERE TO USE SARAN FILM

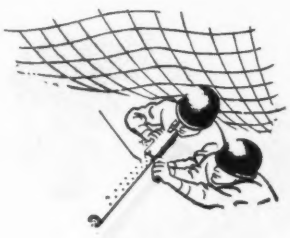


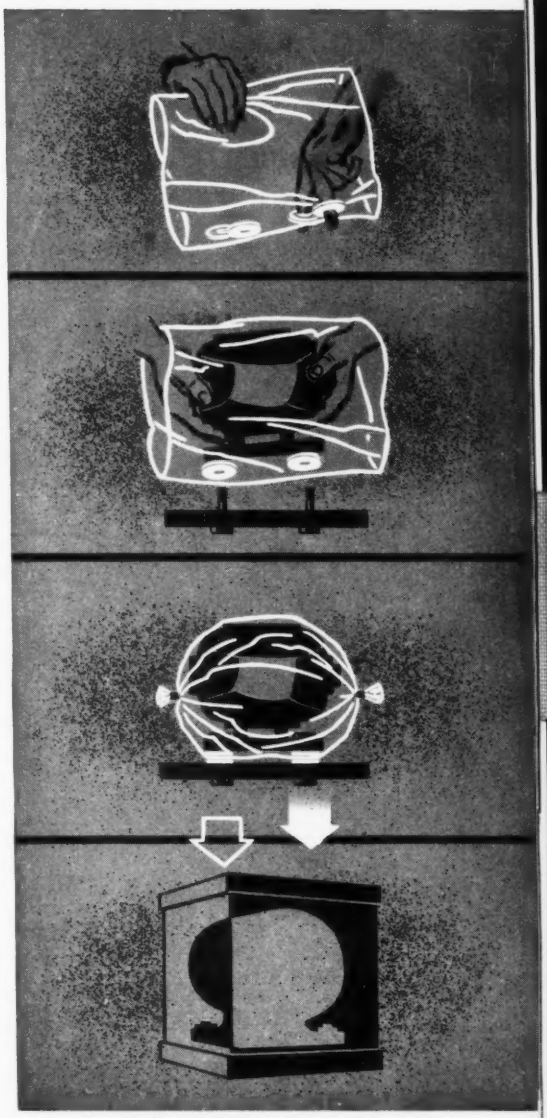
The packaging technique designated as Method II (illustrated), requires the use of the right *methods* and the right *materials*. The efficiency of a correctly engineered package is only as good as the moistureproofness of the film barrier. In keeping moisture from the product, Saran Film is three times more effective than the next best comparable plastic material . . . it affords complete protection for an exceptional length of time . . . and it ordinarily requires only one-quarter the amount of desiccant needed with similar protectives.

While Saran Film is being devoted outstandingly to the protection of precision metal parts, constant research is suggesting great opportunities for widespread usage of its individual advantages in varied packaging fields where freshness of product and the appeal of appearance are important considerations. Laboratory tests indicate Saran Film to be ideal for those who take pride in guaranteeing that the quality of their product has complete protection up to the very moment it reaches the consumer.

SARAN FILM PROPERTIES AT A GLANCE

Saran Film is a thermoplastic . . . basically a vinylidene chloride resin. It is extra tough, clearly transparent . . . flexible, even at low temperatures . . . free of fire hazard. Its notable ability to "keep moisture in its place" is retained—even improved!—with age. And Saran Film is highly resistant to the attack of almost every chemical combination: acids, alkalis, organic solvents, salt solutions. You are invited to consult Dow regarding additional details.



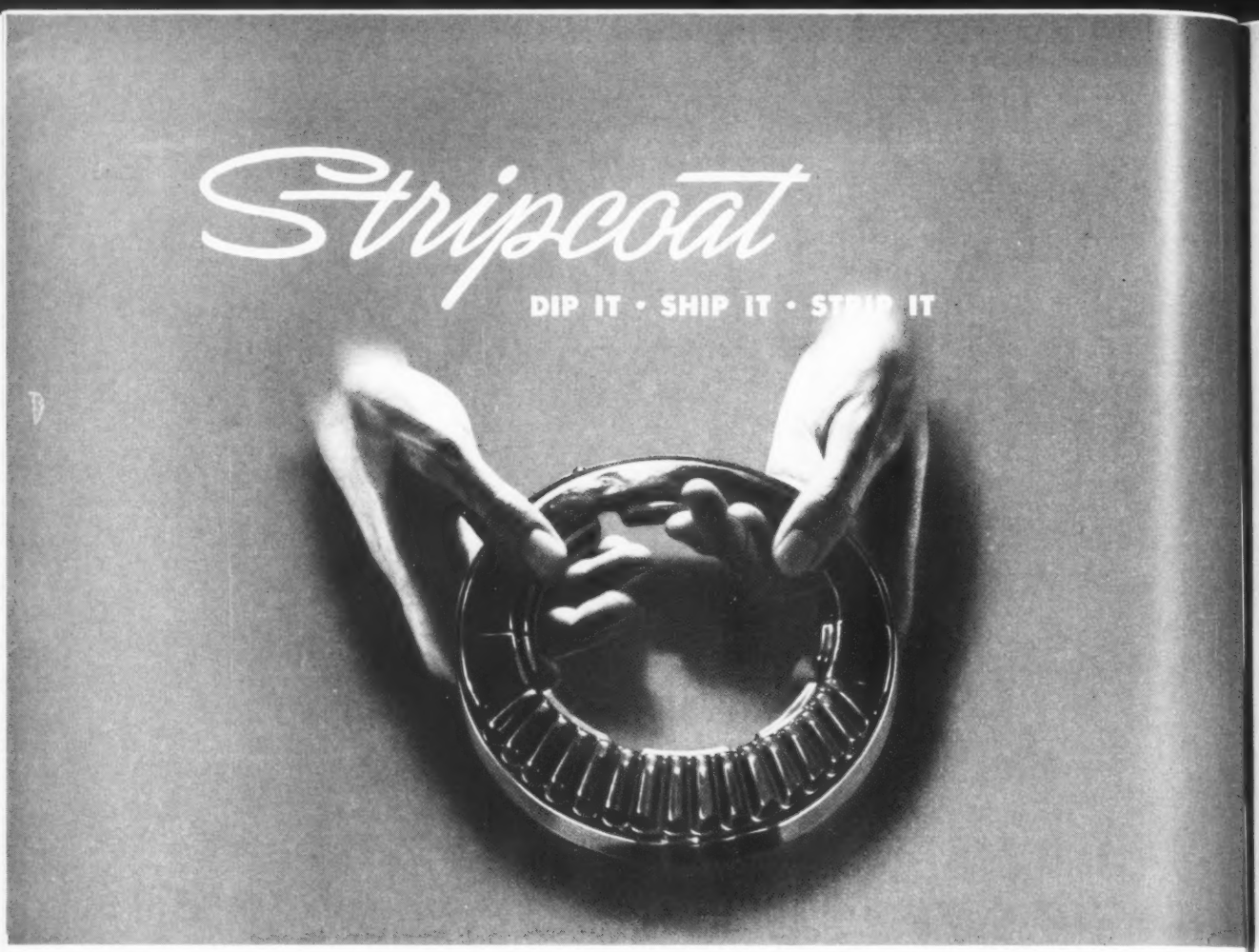


An example of Method II packaging—From top down: Saran Film moistureproof "Floating Bag," seamless, with bolt-holes. . . . Electric motor, to which desiccant is attached, is inserted in enclosure and bolted to platform, thus eliminating all stress on bag; gaskets around bolt-holes protect film and form moisture-tight seal. . . . Envelope ends sealed, in this instance by lead rings. . . . Finished package provides external protection for "Floating Bag" and product.

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Hot melt dip protects metal products

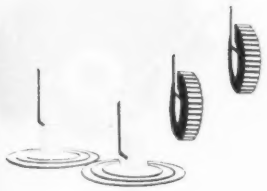
Stripcoat is one of the important advances born of the necessities of world-wide war. This Dow product is a tough, efficient plastic "skin" used in the shipment and storage of parts and assemblies of metal and part-metal fabrication. *Complete* protection against corrosion and rough handling is provided merely by dipping the part in a hot melt of Stripcoat. This single simple operation saves labor, time and cost. And Stripcoat removal, too, is handily accomplished by peeling, leaving the part ready for instant use.

Because of the limitless opportunities suggested by these fundamental advantages, Stripcoat has assumed a logical place in the plans of packaging users in many fields of industry. For, with Stripcoat, it is merely "Dip it—Ship it—Strip it."

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HOW AND WHY STRIPCOAT IS USED

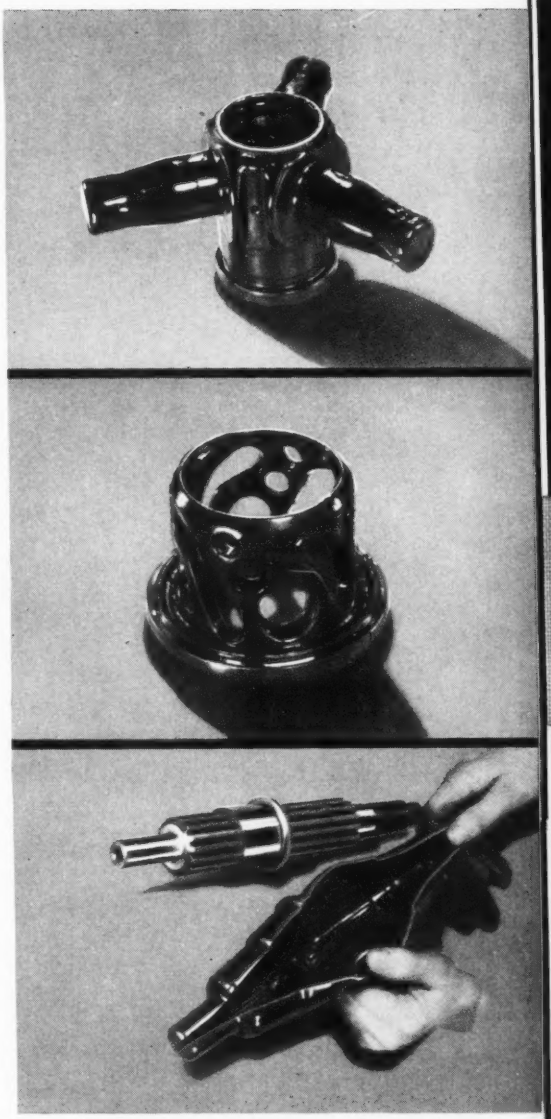


The technique used with Stripcoat consists simply of hand- or machine-dipping a cleaned metal part (such as the aircraft propeller hub parts and gear illustrated) in a 350° to 375° F. pure Stripcoat melt. The cool metal absorbs heat from the adhering coating which sets within a few seconds in ordinary room atmosphere: no quenching or special drying equipment is needed. The result is a tough, uniform, resilient "skin" that is highly resistant to rubbing and scuffing; when parts are stacked or piled, it will withstand considerable weight pressure without puncture by the metal. It is rupture-proof under expansion and contraction of the metal in extreme temperatures. At destination, or following even long periods of storage, Stripcoat is easily slit with a knife and stripped off.

In actual use, Stripcoat has made possible an average saving of 80% in man-hours, and has provided substantial new efficiencies in various phases of metal protection.

STRIPCOAT PROPERTIES AT A GLANCE

The essential ingredient of Stripcoat is Ethocel (Dow Ethylcellulose). This inherently tough thermoplastic affords protection to polished, machined and rough metal surfaces, but will not adhere to itself. It is abrasion-resistant to a marked degree. Stripcoat's protective qualities are retained from −30° to 150° F., and it will withstand 100% Relative Humidity at 120° F. Water- and corrosion-proof, it is also highly resistant to salt solution. Dow offers further technical data upon request.



The illustration on the facing page and those above show typical aircraft parts after dipping in Stripcoat. Picture immediately above illustrates Stripcoat protective "skin" which has been slit for easy stripping.

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Rigid transparent packaging with smart sales appeal

In the past many packaging users have been inclined to look upon all transparent rigid plastic sheeting as being substantially alike. But as the use of this type of material has expanded, it has been demonstrated in actual performance that Ethocel Sheeting—Dow Ethylcellulose—for very specific reasons is truly outstanding. Its strength and ductility . . . its essential property of retaining all its serviceability and fresh sales appeal under the most adverse conditions of handling and shelf-wear and temperature extremes . . . the practical ease with which it is formed . . . the wide variety of its possibilities for shaping and conjoining . . . the low cost of its fabrication—all these advantages, plus many more, mark Ethocel Sheeting for successful use where other materials may fail.

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HOW AND WHERE TO USE ETHOCEL SHEETING



The general uses of rigid transparent sheetings are well known. They are utilized in widely variegated types of merchandising and protective packaging, ranging from humidity indicators to rare orchids and other delicate products requiring both visual and protective aid. In a great many instances Ethocel Sheeting offers qualities and advantages not found in any comparable sheeting substance.

ETHOCEL SHEETING PROPERTIES AT A GLANCE

Ethocel Sheeting, cast from Dow Ethylcellulose, is excellent in both impact and tensile strengths, and remains unchanged within a range of temperatures from −70° to 250° F.! Its inherent pliability permits bending, forming and deep-drawing into seamless ovals, circles, hemispheres, oblongs; and cylinders can be drawn to depths as much as two-thirds the diameter. Ethocel Sheeting can be continuously beaded, crimped, scored, creased, or folded through beaded edges. Cementing, riveting, sewing and stapling are all cheaply practicable. When subject to any of these operations, Ethocel Sheeting will retain intact all the appeal of its brilliant luster and fine clarity. Under long exposure to strong light in show-windows or display counters, Ethocel will not discolor or become brittle. It will take printing in any ordinary technique, and it can be finished in high gloss or rich matte, in an extensive range of colors, in translucent or opaque forms as well as transparent. Complete information relative to Ethocel's application may be had by writing Dow.





These examples of Ethocel Sheeting fabrications illustrate uses of such operations as beading, cementing, printing, and combining with other materials. The humidity indicator (bottom) is a practical application of Ethocel Sheeting, often used as an additional safeguard in Method II packaging (See Saran Film section).

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DIP IT • SHIP IT • STRIP IT

Saran Film

KEEPS MOISTURE IN ITS PLACE

Ethocel Sheeting

FLEXIBLE AND TRANSPARENT

The Dow Chemical Company

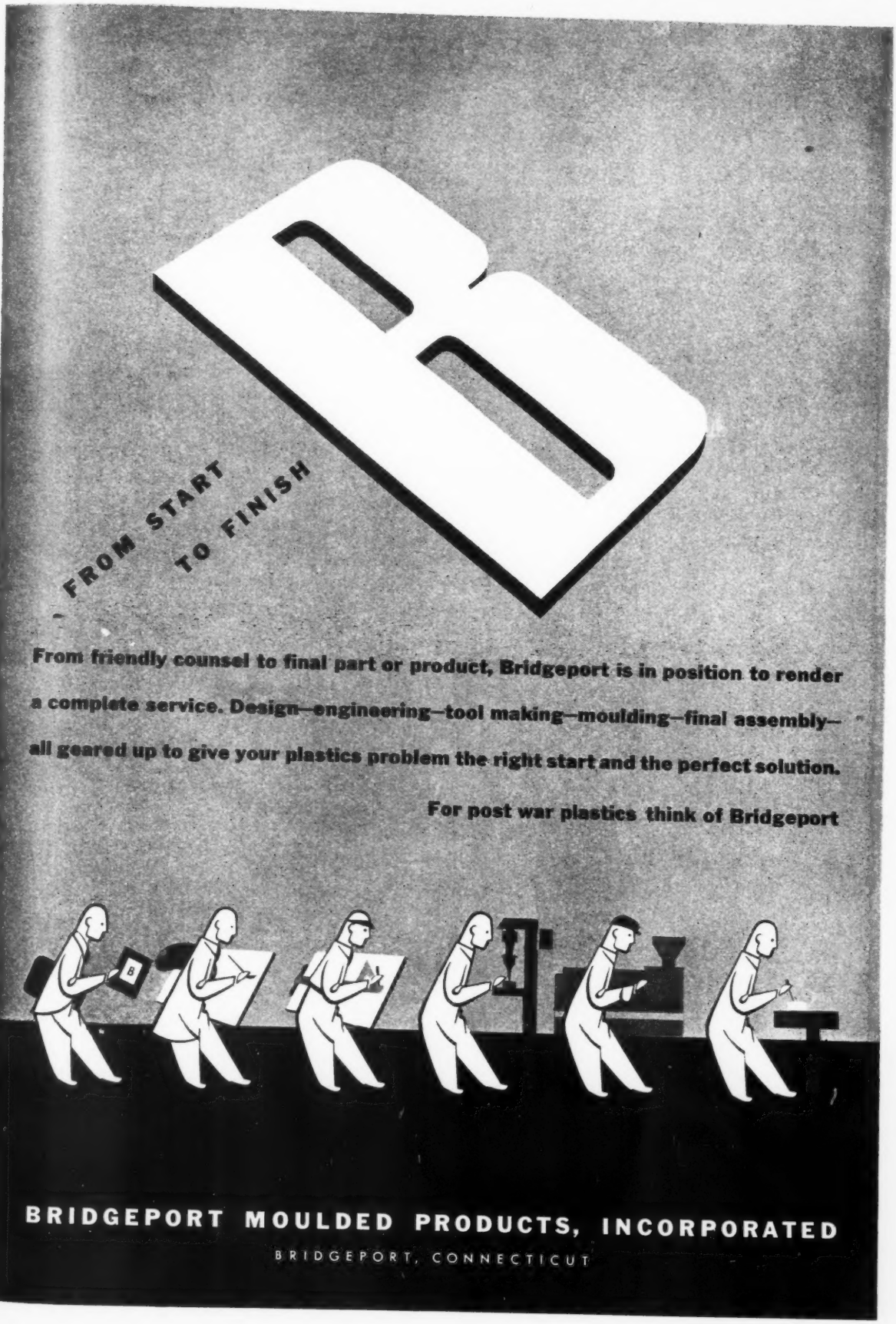
MIDLAND, MICHIGAN

New York • Boston • Washington • Philadelphia • Cleveland
Detroit • Chicago • St. Louis • Houston • San Francisco
Los Angeles • Seattle



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B
FROM START
TO FINISH
From friendly counsel to final part or product, Bridgeport is in position to render a complete service. Design—engineering—tool making—moulding—final assembly—all geared up to give your plastics problem the right start and the perfect solution.
For post war plastics think of Bridgeport
BRIDGEPORT MOULDED PRODUCTS, INCORPORATED
BRIDGEPORT, CONNECTICUT

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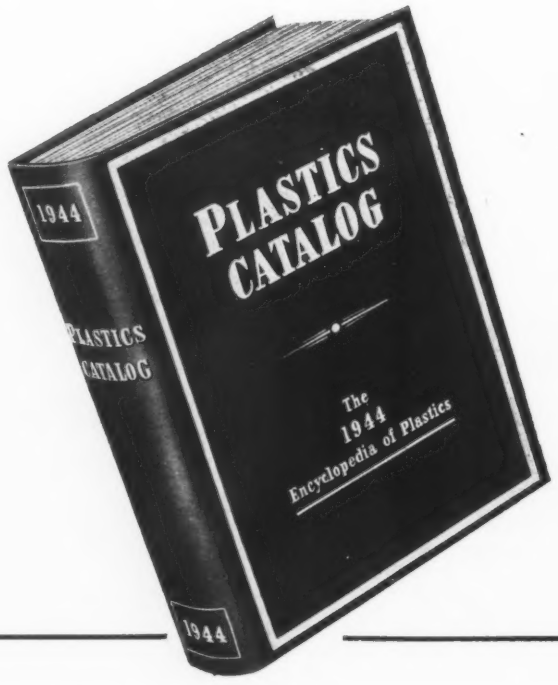
ENCYCLOPEDIA OF PLASTICS

• Full scope of plastics development is covered in this huge 984-page volume. Dozens of new articles detail the new materials and new processes of the past year. More than 150 chapters, re-written and re-illustrated, bring the reader up to date on every commercially used plastic material—including molding powders, coatings, fibers, laminates, synthetic rubbers, plywood; all current production processes; machinery and equipment used in the industry. The CATALOG contains a number of directories to suppliers and producers, gives detailed information about personnel and facilities of custom molders and other fabricators. A bibliography and a glossary help in the search for information.

USEFUL FOR POSTWAR PLANNING

Because the PLASTICS CATALOG is the only combination of basic encyclopedia and annual recapitulation of progress, it is an invaluable handbook not only for users and makers of plastics, but for those in all industries who must keep abreast of new material developments. By bringing the reader into the present, with a broad case-history presentation of wartime achievements, the CATALOG furnishes the factual basis upon which intelligent postwar planning may be projected.

The book also contains 8 very large gate-folded charts of PLASTICS PROPERTIES, SOLVENTS, PLASTICIZERS, SYNTHETIC RUBBERS, etc.



SECTION HEADINGS
(contain more than 150 articles)

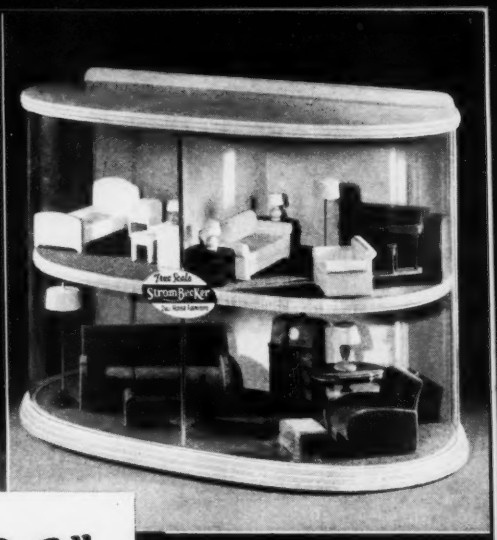
PLASTICS IN WAR
TESTS AND SPECIFICATIONS
MATERIALS
ENGINEERING AND MOLDING
FABRICATING, FINISHING AND ASSEMBLY
MACHINERY AND EQUIPMENT
LAMINATES, PLYWOOD AND VULCANIZED FIBRE
COATINGS
SYNTHETIC FIBERS
SYNTHETIC RUBBER AND RUBBER-LIKE PLASTICS
INDEX
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$6 *per copy*

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PLASTICS CATALOG
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NEW YORK 17, N. Y.

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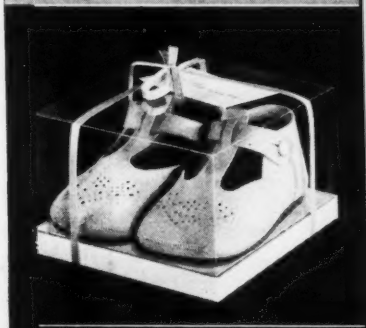




From the word "GO"

AS of the closing date for this advertisement, the question "When can civilian requirements for Eastman Acetate Sheet be met?" has to go unanswered. But it won't take long to begin shipments once the "Go Ahead" signal is given. Until then, Eastman Acetate Sheet continues its contribution to the making of essential wartime products.









Special Packaging Workshop

And right now Kodak's Transparent Packaging Laboratory is in active operation at the Kodak Park Works in Rochester. It offers practical assistance to manufacturers interested in the many applications of Eastman Acetate Sheet.

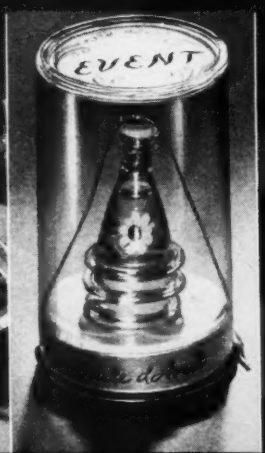
• • •

For suggestions concerning your packaging problems and latest information as to the availability of Eastman Acetate Sheet, write to the Chemical Sales Division, Rochester 4, N. Y.

EASTMAN ACETATE SHEET

ATTRACTS • PROTECTS • SELLS







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PLASTICS AND PACKAGING

There are a great many places where plastics can be used as a packaging material for war products. The General Electric Company would like you to consider their broad experience in this field gained from the many plastic packages they have produced from a wide variety of materials.

With innumerable methods of assembly combined with versatile materials, General Electric is able to design and engineer a custom package to suit your needs—to give you not only economy of manufacture but high quality products.

G-E designers, backed by knowledge of plastics and packaging, are ready to assist you. Plastics should be a consideration to help solve your problems of the present. G-E plasticians are also ready to apply these colorful materials to your packaging plans for the future. For further information write Section Q-283, One Plastics Avenue, Pittsfield, Mass.

FIFTY YEARS IN THE PLASTICS INDUSTRY

GENERAL ELECTRIC

PD-283

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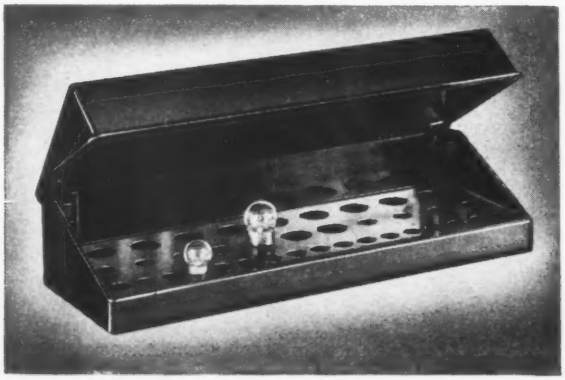
DUREZ wartime applications pace tomorrow's industrial packaging!



1. COMPLICATED MOLDINGS are the best proof of Durez versatility. This airplane sextant housing is a one-piece molding job that measures 10x10x10 inches! High impact and extreme light weight are vital characteristics. The integral finish, too, is impervious to moisture and extreme changes in temperature.



2. COMPACTNESS is a military must. Durez fits naturally into the picture with its molding versatility which permits the designer to cut corners in reducing the "Handie-Talkie" to essentials. High impact strength, durability, high dielectric strength, moisture resistance—all these are part and parcel of this Durez-molded housing.



3. THE BIG BOMBERS carry 37 spare bulbs on every trip! Again Durez got the call for the bulk-container housing. The base and cover are a phenolic molding compound job. But in addition, there's a laminated phenolic sheet, padded with sponge rubber which fits into three molded-in sections of the base.



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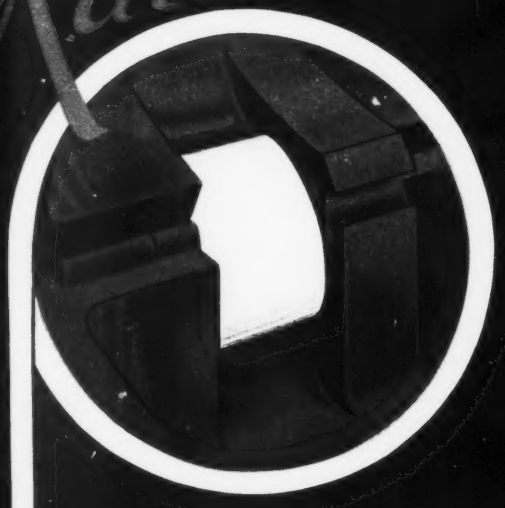
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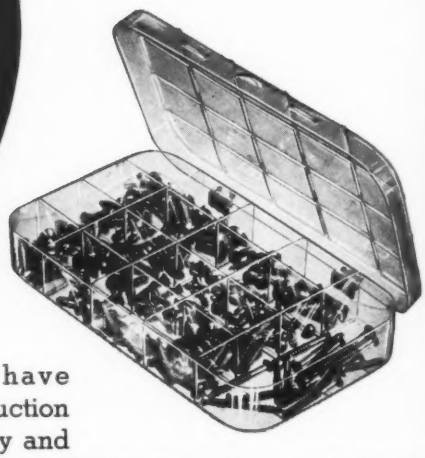
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ADHESIVES

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Chart: Adhesives—Types, Characteristics, Properties

Opposite 380

Technical aspects of adhesives

by Dr. F. C. Campins

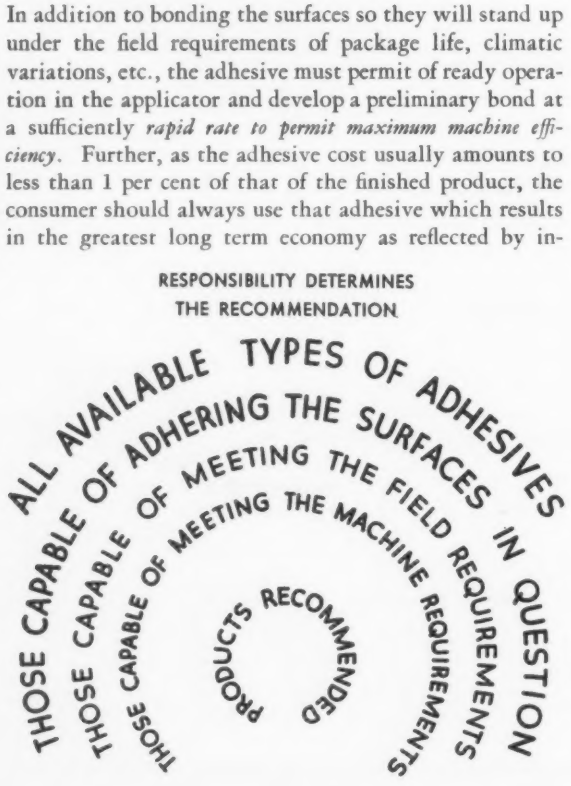
To handle effectively the wide variety of adhesives in the day-to-day jobs of modern packaging, the consumer should have a clear picture of the basic principles that decide the proper selection and manipulation of those glues to give the package its necessary "shelf life."

An adhesive is a material in liquid or soft plastic condition for purposes of application, capable of changing to a semi-solid jelly or to a hard film of high cohesive ability and suitable bonding power.

A good bond between two surfaces means, in general, that the fabric or the material must be torn or lifted if an attempt is made to pull the surfaces apart. This naturally depends on the materials treated. (See Table 3, chart on p. 380) Since the fibres of certain papers are easily torn, the adhesives may be low in tensile strength and still give a fabric-tearing bond, whereas the same adhesive, used between two pieces of bond or parchment paper, may not work.

Responsibilities of the adhesive

In addition to bonding the surfaces so they will stand up under the field requirements of package life, climatic variations, etc., the adhesive must permit of ready operation in the applicator and develop a preliminary bond at a sufficiently *rapid rate to permit maximum machine efficiency*. Further, as the adhesive cost usually amounts to less than 1 per cent of that of the finished product, the consumer should always use that adhesive which results in the greatest long term economy as reflected by increased production, lowered waste, better quality, etc., and not short-sightedly consider only the cost of the adhesive.



RANGE OF CHOICE IS NARROWED BY EACH SUCCEEDING ZONE OF RESPONSIBILITY UNTIL THE CENTER OF RECOMMENDATION IS ARRIVED AT.

Fig. 1

Figure below shows how the adhesive manufacturer arrives at a commercial recommendation, at all times basing his choice on the ability of the adhesive to meet its responsibilities. Further, if only one or two adhesives are available for some very unique surfaces, then clearly, if the job is to be materialized at all, these products would have to be used, even though that may mean compromise in or relief from other requirements. Thus, on new developments, the combined coöperation of the package machinery builder, the paper or sheeting supplier, the adhesive manufacturer and the production manager should enable the several requirements to be so adjusted as to make for ultimate success.

Each successive zone shown in Fig. 1 should be considered to develop the viewpoint and perspective that will lead to efficiency and effectiveness in the day-to-day use of adhesives.

Types of adhesives and types of adhesion

Referring back to the definition given above for an adhesive, several features all important to the user of adhesives are brought out as follows:

At Application		**In Final Bond**
For activation or prebonding *usually in the gluing mechanism*		After fully adjusting *itself to room conditions*
The Adhesive is		***The Adhesive is***
Liquid or Soft Plastic and Has Flow	Changing to	(Semi) Solid Lacks Flow
To permit its application in a thin film		To achieve a permanent bond

The operator is concerned *not alone with the application*, but also *with the initial stages of bond formation (preliminary setting)* whereby the freshly bonded package may be handled even though the adhesive may take a more or less considerable time to adjust itself fully to its surroundings.

It is also obvious that the extent of *preliminary setting* required of an adhesive *will vary* from job to job; in fact, in some elementary cases the "initial tack" of the adhesive is sufficient. Also, as the requirements at application are usually diametrically opposite to those at preliminary setting, all possible provision should be made at the application stage to facilitate or expedite setting.

To play these stages against each other properly it is necessary to know the *means by which adhesives change from the liquid to the solid state*. Thus:

The Mechanisms of Setting } or { The Methods by Which Adhesives Change from the Liquid to the Solid State } are by { Change of Concentration of a Volatile Liquid Ingredient } &/or { Change of Temp. } &/or { Change of Chem. Comp.

These processes serve to classify adhesives (see Table 1, insert chart, opp. p. 380). Thus:

All Commercial Types of Adhesive } are { "Solvent" Adhesives } or { Cements / Temperature Sensitive Cements } { Chemical Cements

There are no sharp boundaries between the types and often one or several of the methods of setting may be exploited: and thus the real job of successful application always keeps the setting process clearly in focus so as to secure the maximum rate of setting.

Both these types of adhesives develop final bonds between the surfaces that fall into two classes (Table 2):

1. Where the adhesive film finally sets in a plastic mass, usually pliable; this is called a *plastic bond*.
2. Where the adhesive film finally sets into a hard glassy material which may break when the bond is bent, but which continues to supply a film *across* the surfaces, being anchored into or between the fibres, forming a *penetration or mechanical bond*.

There is an interrelation between these two types of adhesion, because all adhesives in the preliminary setting stage give a plastic bond. Thus, many cold vegetable adhesives, after sufficient (preliminary) setting to hold the surfaces together, make a plastic bond which, in those cases where the adhesives finally dry out to a hard, brittle condition, must be replaced by a penetration bond. These conditions are shown in Fig. 2, p. 368.

Capabilities of adhering

Adhesion generally occurs between the surface layers. Therefore the adhesive bond should not be held responsible for failures due to discontinuity of structure, cracks, zones of low tensile strength, etc., below the surface.

In some cases it is possible to work through this false, unreliable or difficult surface by dissolving or melting it away through the adhesive, but this slows the process.

The adhesive should wet the surface to which it would subsequently adhere. This is necessary not only to spread a thin continuous film, but probably also to establish whether or not those affinities exist which seem absolutely necessary to effect permanent bonding.

The adhesive must preserve continuity across the surfaces to be bonded. (If it also preserves continuity along the surfaces it may have added value for developing greaseproofness, etc., but this is not necessary for adhesion.) This means that:

1. The surfaces should be brought together while the film of glue is active (i.e., liquid, semi-solid or soft plastic), and in general held together until the semi-solid condition has developed in the glue film, so that it can successfully overcome the tension that may be imposed due to resiliency of the flaps, etc.
2. The adhesive should not be a crystalline but rather a colloid type of material.
3. Porous or absorbent surfaces necessitate controlled penetration of the adhesive between the instant of application and the time when preliminary setting occurs; that is, the properties of the adhesive must compensate as a counterbalance for the properties of the surfaces. (See Fig. 3, p. 369.)

The adhesive bond must have a tensile strength equal to or greater than that of either of the materials bonded. Thus, the strength of adhesive is keyed to that of the material. In other words, an animal glue of high tensile strength when used to join paper together cannot possibly develop a stronger bond than the strength of the paper. Or any adhesive used to join metal to itself cannot possibly develop as strong a bond as the metal because no known adhesive is that strong in itself.

Thus, under ideal conditions where the two freshly adhered surfaces are kept (under pressure) in tension-free contact for a prolonged period these generalizations guide us in evaluating their capability of adhesion, but even under these conditions, the failure to adhere, called *final failure*, will sometimes occur. *The causes of final failure can well be examined at this time.* (These must naturally involve violations of the generalizations.)

Common causes of final failure

For "solvent" types: These are products made liquid or semi-liquid by the presence of volatile liquids used to dissolve and/or suspend the adhesive ingredients. These liquids must be largely removed to achieve setting or bonding, and the *final failure* of "solvent" types is mainly tied in with the "solvent." Thus:

(a) Inability to lose solvent would lead to non-setting and so to final failure. This can be brought about by:

1. Both surfaces being impervious to diffusion of the solvent: Here the adhesive would never dry. (See Table 3.) This shows why at least one surface should permit diffusion or be porous. A remedy sometimes used where both surfaces are impervious to the volatile solvent is to *temper* or allow evaporation of the solvents before bringing the sheets together. This is particularly effective where the adhesive develops a high lingering tack and is of a plastic nature. This expedient is often used in handling transparent tissues.

2. The surroundings and the materials to be adhered are already saturated with the vapor of the "solvent" and so cannot remove solvent from the adhesive. The commercial equivalent is the frequently overlooked fact that in an atmosphere fully saturated with moisture (i.e., constantly at 100 per cent relative humidity) cold aqueous adhesives would be largely useless as they would not set and in many cases would penetrate excessively as a consequence into porous surfaces.

(b) Shrinkage on drying from loss of the volatile solvent. This factor is unnoticed where one of the surfaces is pliable and can follow the shrinking glue film. Where the surfaces are rigidly separated, the forces set up by shrinkage often disrupt the glue film and lead to failure of the bond. (This is sometimes incorrectly referred to as "crystallization.")

(c) Excessive penetration due to excessive solvent: As the body of the adhesive may be varied by regulating the amount of solvent, its dilution should be held within

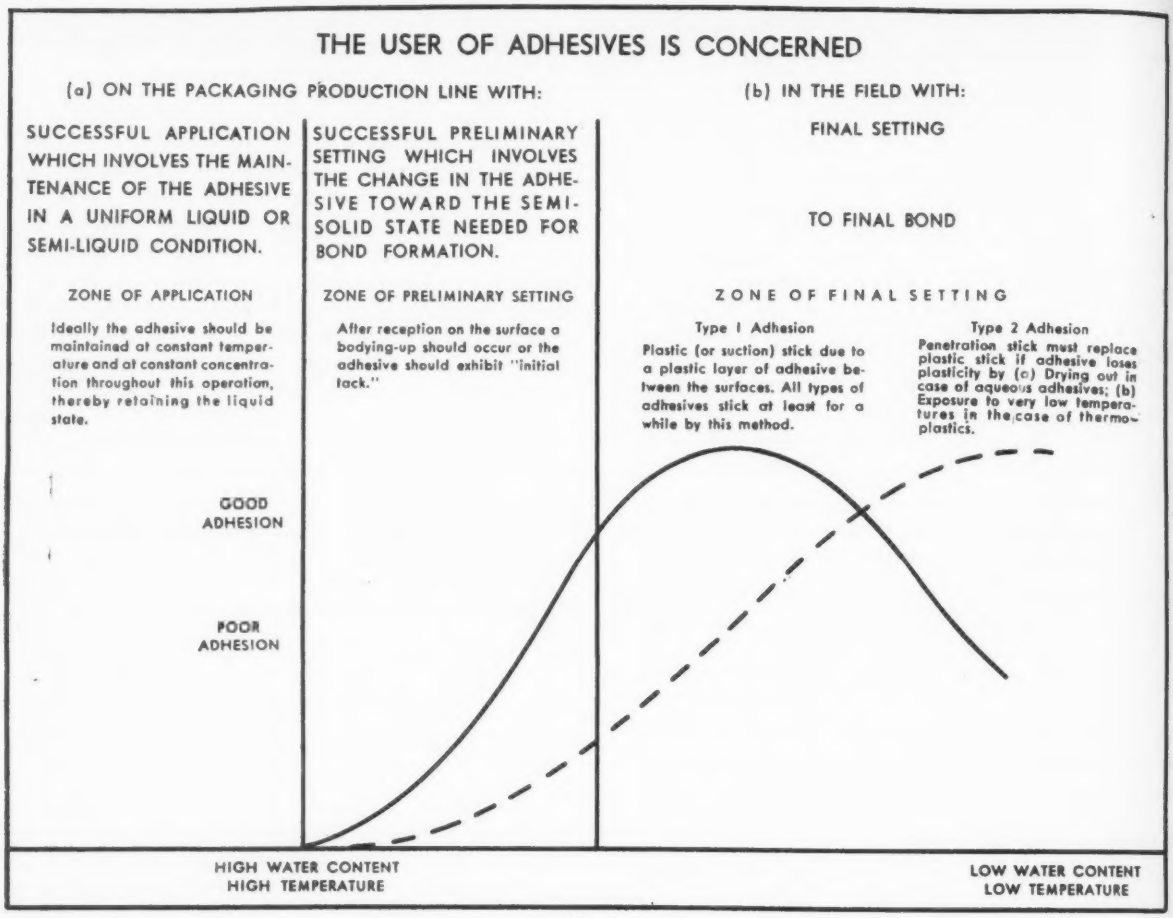


Fig. 2

certain limits to avoid excessive penetration between the time of application and the setting or bodying-up of the product to a degree sufficient to stop penetration. The slower setting glues as a class are generally used with heavier bodies to compensate for this. All the factors come into evidence when these adhesives are used on porous surfaces. (See Fig. 3.)

(d) Temperature limits in storage and use due to solvent. The adhesive should be stored and used within the proper temperature range where the solvent is liquid.

(e) Solvent action on the sheeting, inks, etc. Often some of the liquid ingredients in the adhesive exert action on the stock, ink, etc., which makes the adhesive unsuitable for the job. Such effects include:

(a) *Blocking:* Here the adhesive solvents partially dissolve and so soften the sheeting as they seep or migrate through it. This partly dissolved sheeting by becoming soft and sticky, tends to adhere to other sheeting packed in close contact.

In aqueous adhesives, e.g., envelope gums, moisture reactivation achieves the same result, i.e., the sticking together of the units called blocking.

(b) *Bleeding:* Here the solvent, which may go through the sheeting either by diffusion or by solution, attacks the inks or colors, causing them to fuzz, run, blot, stain, or show through. This is particularly likely to happen when the solvent is not very volatile and has a strong affinity for the sheeting (as this usually means a rapid rate of diffusion).

(c) *Blisters:* Too active a solvent or swelling action on the sheeting, causes bulging or blisters.

(f) Inadequate penetration of non-plastic types. If one of the faces does not permit of a penetration bond into or between the fibres, then, where the adhesive dries out to a non-plastic substance, bond failure will occur at this face (see Fig. 2) and the glue film will pull away therefrom while adhering to the other face.

For cement types: These are adhesives that change from the liquid to the semi-solid state without loss of solvents (analogous to solder or Portland cement). They can therefore set on non-porous or vaporproof surfaces. The final bond may be of the plastic or the penetration type. Thermoplastic adhesives generally give *plastic* bonds, and failures of this class of bond generally are:

(a) *"Cold Flow" Failure.* While the plastic adhesive should ideally have a yield point greater than any constant tension to which the bond is exposed so as not to flow, in practice the yield point is often below this and so the product behaves as a viscous

liquid and exhibits flow. Thus where the final bond is under a continuous tension, failure may occur through this tendency to flow. This effect is more pronounced in warm weather.

(b) *Embrittlement Failure.* The (plastic) adhesive may under certain conditions lose its plasticity and exhibit low tensile bond strength due to the loss of the plastic or suction bond and/or to the embrittlement of the adhesive. Thus thermoplastic cements often exhibit embrittlement at low temperatures and so fail. Whereas in chemical cements, as the products may set to a hard glassy material, a penetration bond must be established (either into or between the fibres of both surfaces) before final setting occurs. Naturally in this case, the tensile strength of the set cement should be sufficiently high to tear fibres.

Manipulative recommendations for the user.

Granted the proper recommendation in terms of the responsibilities of the adhesive by some reputable manufacturer, there still remains the problem of manipulation of the adhesive to assure a good final bond. These factors are divided into three categories, related to:

1. The adhesive itself
2. The mechanism for the application
3. The surfaces to be bonded.

Factors concerned with the adhesive are:

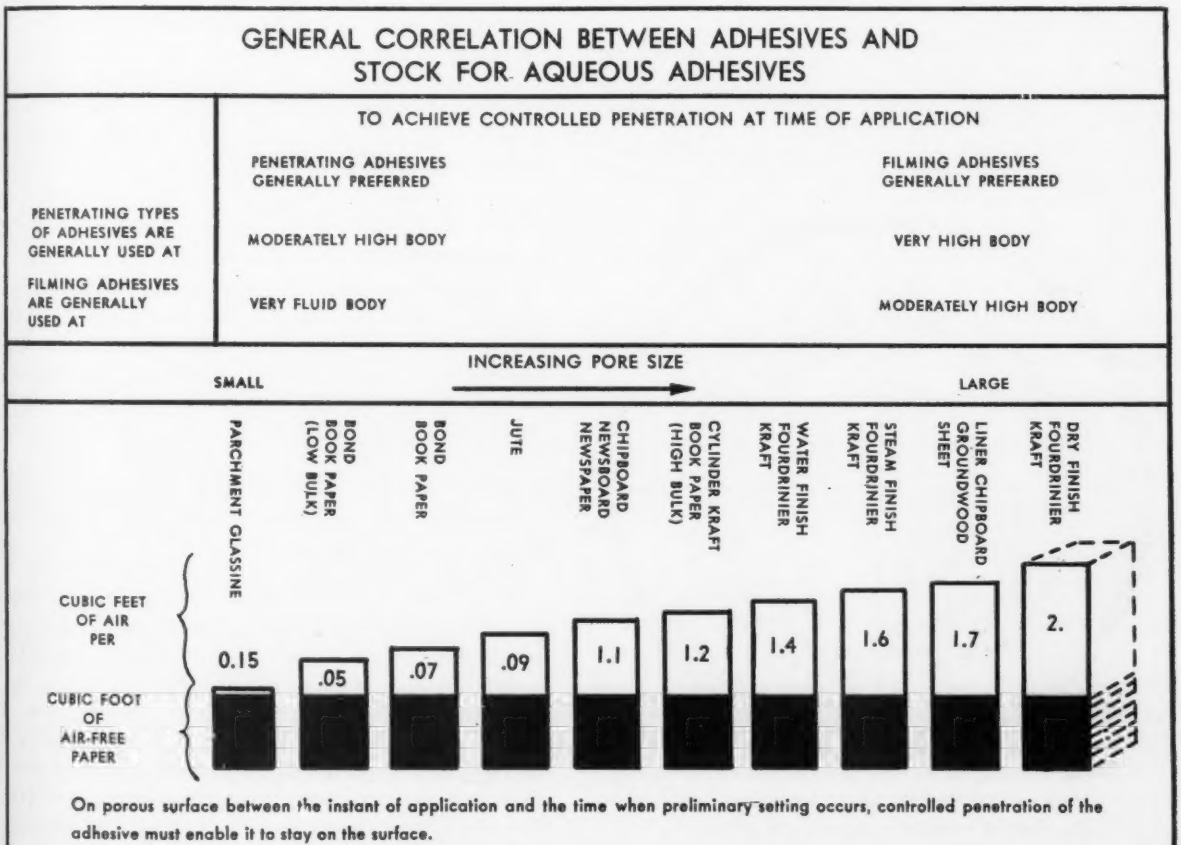
1. Temperature of glue: Cold glues should be at room temperature before dilution, as products chilled by exposure to low temperatures would be unduly heavy and so induce the user to add more water than is necessary.

Heat will thin out most glues, so that the proper working consistency can be attained with reduced dilution in summer; or even with no dilution where the glue pot is heated. In fact, heating the glue pot often provides a simple method of speeding up the setting of the adhesive.

2. Dilution: If adhesives are thinned beyond the limitations outlined by the supplier, the solids in the glue will be carried too deeply into the stock leaving an inadequate film between the surfaces to provide a proper bond. In other words, excessive dilution will destroy the continuity of the film which is essential for adhesion. On the other hand, insufficient dilution may lessen the degree of penetration which is necessary to secure anchorage. Therefore, dilutions should be accurate.

It is, in general, desirable to agitate the adhesive prior

Fig. 3



On porous surface between the instant of application and the time when preliminary setting occurs, controlled penetration of the adhesive must enable it to stay on the surface.

NOTE: The above diagram would seem to emphasize porosity, but it must be remembered that penetration bonds are attainable even on glassines or parchments indicating a penetration into the fibre. This is brought out in Fig. 5 where mechanism of setting is discussed.

to adding the diluent so as to get a true picture of its consistency under operation. Only then should the diluent be added with continued agitation.

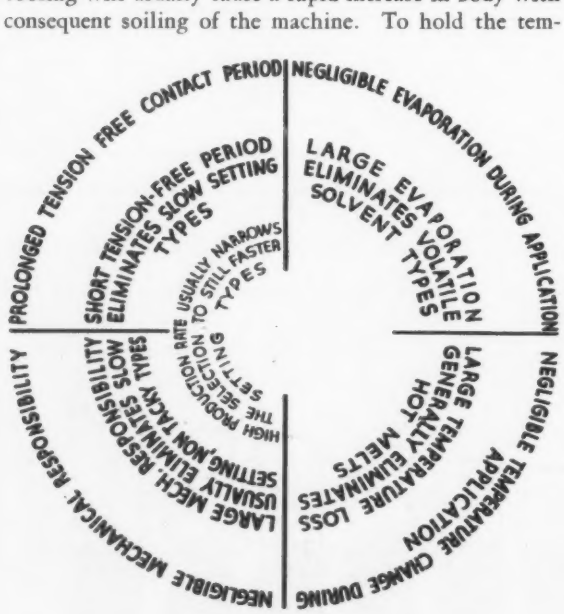
3. Care and storage: It is advisable to keep the container covered to avoid any thickening by evaporation, or any contamination by dirt. It is always advisable to store the containers at operating-room temperature. In winter, apparent heaviness of the adhesives is due to cold; so, before dilution, products should be brought to room temperature. It is also undesirable to store products near radiators as this will cause thinning out and promote evaporation of volatile solvents.

Mechanism of application:

This should permit effective transfer of the adhesive in an adjustable thin film from the glue pot to the surface (or surfaces) being bonded. This involves:

1. Maintenance of consistency: To insure proper mechanical operation and ready transfer of the adhesive, the body or consistency of the adhesive in the glue pot must be kept within a given range. As the glue thickens in the pot through evaporation, it should be thinned, preferably with a special dilute glue mixture. This can be prepared by thoroughly mixing one part of glue with two parts of solvent. For any glue that contains volatile solvents, a cover is desirable to retard thickening through evaporation.

When the body of the adhesive is regulated by temperature, e.g., where glues are applied at temperatures above that of the room, overheating will cause excessive thinning, which results in splashing. Other harmful effects are burning and decomposition. Again undue cooling will usually cause a rapid increase in body with consequent soiling of the machine. To hold the temperature of the glue substantially constant, and thereby obviate localized overheating, the glue pot should be jacketed with water or some other liquid which is kept hot by a thermostatically controlled heater.



HOW EACH SUCCEEDING MACHINE REQUIREMENT NARROWS RANGE OF CHOICE UNTIL CENTER OF RECOMMENDATION IS ARRIVED AT.

Fig. 4

2. The applicator should have true surfaces to assure uniform transfer to the desired area. This may mean periodic cleaning of the surfaces.

3. The applicator should provide means both for regulating the thickness of the film and for insuring uniform thickness throughout the film. Adjust thickness of film for the regular production rate of the machine.

The surfaces to be glued should:

1. Come into uniform contact with the applicator to effect proper transfer of adhesive. This means that surfaces must be true.

2. Receive a thin, uniform film of adhesive from the applicator.

3. Come into uniform contact with the surfaces to provide a thin, uniform film of adhesive.

4. Be held in a strain-free condition after contact is established (as in 3) by some device, such as a compression belt, until the adhesive has set sufficiently to effect a bond across the surfaces and so permit the handling of the package. When this bond has fully dried or adjusted itself to room conditions, it should be slightly stronger than the materials bonded, to make it fabric-tearing.

5. Generally be at room temperature and adjusted to room conditions. To avoid trouble with cold stock, it is advisable to store it under operating-room conditions.

6. Be of seasoned stock. Damp or green stock (or even seasoned stock in unduly damp weather) tends to slow up operations. Stock should be supplied from storage properly seasoned.

Meeting field conditions

General requirements

The adhesive supplier, through long experience, knows that his product must meet field conditions after a satisfactory bond is accomplished under room conditions. These hazards, which include simple aging, exposure to extremes of climate, humidity and moisture, exposure to grease, etc., are discussed below.

Conditions that develop flow failure

The redevelopment of excessive flow will lead to bond failure if the adhesive:

1. Slowly yields to any constant tension, or

2. Continues to penetrate or migrate into a porous face, destroying film continuity by *excessive penetration* across the surfaces. Further, as adhesives are often merely physical mixtures of ingredients, these may not all necessarily migrate at the same rate. This leads to:

3. Loss of bonding characteristics, embrittlement, etc., by partial migration of one or more of its ingredients through a relatively non-porous surface at a greater rate than the others. Here the products that remain behind are in themselves unsatisfactory for bonding.

The common climatic conditions that bring about this flow affect many types of aqueous adhesive and include:

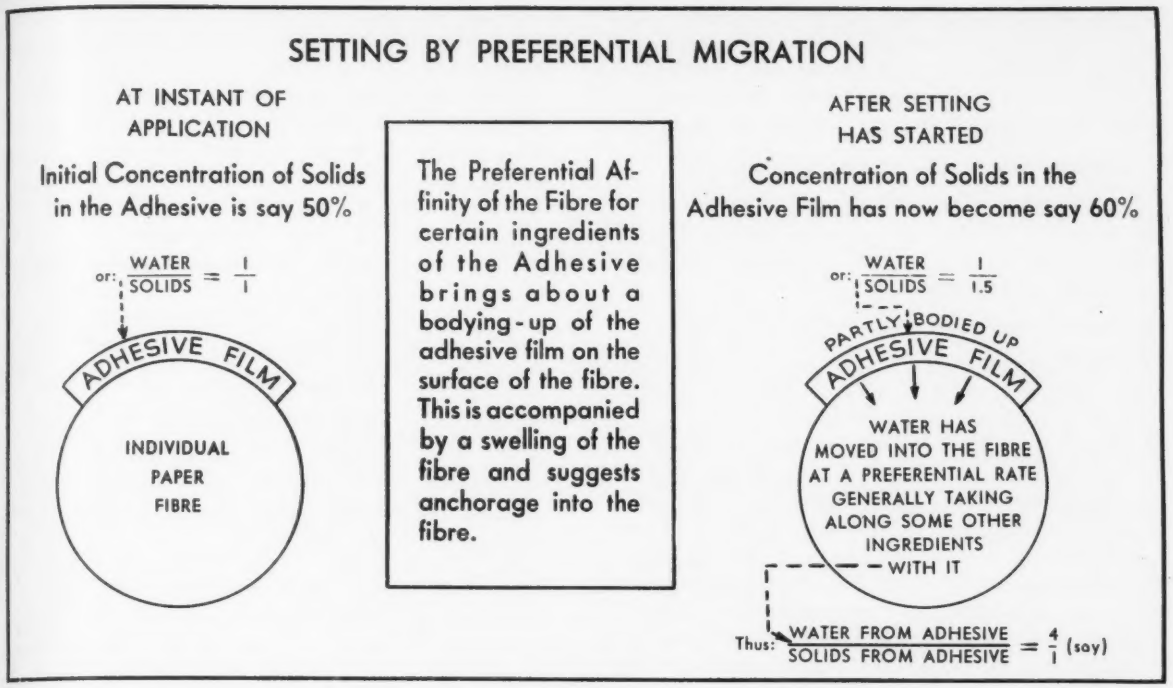


Fig. 5

High Temperature. Thermoplastic types will often soften unduly as will most other plastic adhesives. Where the bond is under a small but constant tension, the viscous flow of the adhesive ultimately will cause it to yield. The same condition occurs at a decreased rate at room temperature. Examples are:

1. Where a thermoplastic adhesive is used for sealing the springy or resilient flaps of a shipping case or carton, failure will in general occur slowly, especially in hot summer weather.
2. Where glassine is laminated to itself or to board with a thermoplastic adhesive, such as amorphous wax, and then this combined sheeting is adhered face to back with a non-plastic aqueous adhesive, blisters or zones of separation will often slowly form in the wax due to the constant shrinkage-pull exercised as the aqueous adhesive dries out. This effect would be minimized by the use of a plastic aqueous glue or a hot flexible glue. On porous surfaces this may be accompanied by excessive penetration.

High Humidity. As aqueous adhesives (which do not exploit chemical setting) use water as a means of dispersing and/or dissolving some or all of their ingredients, it is at once apparent that water as well as high humidity should exert some effect upon the final bond.

Although aqueous adhesives use water to render them liquid, they often have only a limited affinity for moisture vapor. Thus most case sealing glues once dried will remain in the solid state even at 100 per cent relative humidity, when they may in some cases pick up only, say, 10 to 14 per cent moisture. This makes shipments to the tropics possible.

Other aqueous adhesives may have various hygroscopic or moisture-absorbing ingredients added thereto to secure bite, plasticity, etc. These may draw sufficient moisture from fully saturated air to partly or wholly liquefy. Failure will then occur through the three methods listed above.

Type 1. Will usually take place under tension.
Type 2. Shows the general undesirability of using hygroscopic adhesives on porous stocks, because excessive penetration at high humidity is a menace.
Type 3. Here the damp surroundings may cause *migration or seepage of the hygroscopic ingredients*. This sort of failure is prone to appear on surfaces of low porosity where some of the hygroscopic ingredients, attracted by the moisture in the stock, travel away from or ahead of the adhesive into the sheeting.

This condition is noted in the "discoloration" caused by some envelope gums on bond papers, where the migrating ingredients may cause a color change in the paper due to its acidity, etc. These materials may exert a deleterious effect on the sheeting. Another aspect of this is that the high humidity literally *reactivates* any exposed adhesive.

Low Temperature (at high relative humidity). This case is included for completeness; but here, even though the adhesive will absorb its quota of moisture, the low temperature will usually keep the viscosity of the adhesive sufficiently high to obviate the trouble from excessive penetration. (Also see temperature embrittlement.)

Actual Wetting. This will actually remoisten the aqueous adhesive and so promote partial or total penetration as described above. A common unsuspected case

is the sweating that occurs if moisture is deposited in closed freight cars when their temperature drops off at night; after the interior of the car has previously developed a high R. H. during the hot daytime temperatures due to materials that give off moisture vapor.

Causes of loss of film characteristics

This heading covers a multitude of conditions. It will be noted that failure may be due to surface or stock, as well as to the adhesive. We shall discuss here the more common types of failure.

1) Bond embrittlement or "crystallization"

This embrittlement of the bond may be due to physical and/or chemical causes, and both stock and adhesive should be examined for responsibility: Thus:

"Aging" or Migration Failure paralleling the migration of hygroscopic ingredients is commonly found in the bonding of certain transparent tissues where the affinity existing between certain liquid ingredients of the adhesive and the stock can slowly cause their migration. The resulting embrittlement of either the film of glue or the sheeting itself, called "aging failure," is usually a slow process requiring many months. To be quite safe commercially, the estimated life of the package in the field should be well within this period.

Two causes of troubles are: Migration of the plasticizer away from the adhesive into the sheeting. This may result in embrittlement of the glue and so to failure of the plastic adhesive bond. Also migration of the plasticizer away from the sheeting into the glue, resulting in a loss of pliability of the stock. It should be noted that the plasticizer, usually a non-adhesive liquid ingredient, should remain in the adhesive to assure plasticity in the final bond. Ideally the plasticizer should have no effect on the sheeting, but it often has some solvent action.

Temperature Embrittlement: These are a few possibilities:

1. Sometimes only very limited amounts of migration occur in the process of setting, but these ingredients may be of a kind that would cause subsequent embrittlement of the stock or adhesive if the adhesive bond were subjected to heat. A typical case is where hot cement or fertilizer is packed in paper bags.
2. *Loss of Tensile Strength:* This may occur from a variety of causes affecting the adhesive or the stock:

   Certain water-insoluble adhesives still may swell on prolonged submersion in water. Thus an adhesive bond made with this may, on prolonged submersion, lose tensile strength as the adhesive picks up water and swells even though it is still a solid. In other cases the stock itself may lose strength at high humidities and give a deceptive merit to the adhesive.
3. *Rupture Away from the Surfaces:* This class of failure in general is often due to differential expansion, i.e., the adhesive film and the stock expand at different rates under the field conditions and this destroys film continuity across the surfaces.

When the bonded surfaces are immersed in hot wax, bond rupture could well occur through this cause, possibly aided by embrittlement.

When the bonded surfaces are immersed in water, differential expansion under moisture may cause rupture. Thus where two sheets of parchment are adhered with a non-aqueous adhesive—which is also water-insoluble—it may at first appear that this bond would stand prolonged submersion. In most cases it does not, because the parchment expands on submersion while the glue film does not—resulting in rupture.

The same point is well illustrated where a label is applied to a bottle with a non-aqueous adhesive and is then allowed to dry. On submersion, it generally will come off.

These general examples will illustrate the high spots of field failure. These considerations form an essential part of the decisions of the responsible supplier to whom the consumer should carefully point out the probable field history of the package.

Meeting machine requirements

Uniform liquid condition is necessary for proper application. Further, because the adhesive may need more or less time to achieve the right degree of "preliminary setting" for bond formation, it is helpful to have a prolonged tension-free contact between the freshly bonded surfaces to allow for the setting, making no mechanical demands upon the adhesive until this preliminary setting is accomplished. In the interest of insuring bonding under the most adverse conditions, a longer time for the package under pressure in the sealing machine is very desirable. This does not necessarily mean slower production. It also can be achieved through a longer compression line.

The major considerations desirable for wide versatility in the selection of adhesives are (see Fig. 4, p. 370):

1. Negligible evaporation during application.
2. Negligible temperature change in application.
3. Negligible mechanical responsibility prior to preliminary setting.
4. Prolonged tension-free contact period between the freshly bonded surfaces.

Types of applicators

No attempt is made in this article to do more than explain the theory and principles underlying various types and mechanisms for applying adhesives. (The practical aspects and illustrations of actual devices are presented in the article "Equipment for Applying Adhesives," p. 377.)

The several types of glue applicators fall in three classes: (a) Direct application. (b) Direct transfer. (c) Translatory (or indirect transfer).

This method of viewing an applicator in terms of its major type is of particular value in approaching new projects, as it enables a wide selection in terms of the broad types of adhesives that can be handled by that applicator. In doing this, stress should be placed on the evaporation and temperature-change factors. It should also be noted

what measures could be provided partially to reduce mechanical responsibilities as well as to increase the tension-free contact period.

This approach may enable the operator to make the most of his equipment on new developments. Thus for a unit turning out a flat or folded package, e.g., bag, box, etc., if the mechanism can turn out the properly folded flat package and deliver it under a compression belt without having any adhesive whatever in the glue pots, then clearly either a slow or fast glue is suitable—the limitation of the contact factor being overcome by stacking.

Taking the three main types of applicators it will be noted that:

1. Direct applicators can usually be readily protected against evaporation of solvents by a slotted cover; the glue roll partly projecting through the slot. Further, as the sheeting comes into direct contact with the roll that rotates in the glue, if the pot is heated, there is little undue loss of temperature in the applicator. Thus hot glues (hot melts, etc.) are permissible on these units. In general, therefore, this type of mechanism allows a wide choice of adhesives.
2. Simple transfer, in contrast to the direct applicator, permits "spot printing" of the adhesive while the web of paper is in continuous motion.

   It will readily be noted that this mechanism ordinarily allows a fair amount of evaporation and if the adhesive in the pot is heated, by the time it reaches the unheated segment of the transfer roll, there is an appreciable drop in temperature. These factors restrict the use of hot melts and of adhesives with very volatile solvents.
3. Translatory (or indirect) transfer provides great scope for evaporation of solvents as well as for cooling the adhesive between a heated glue and the surface receiving the adhesive. Thus, hot glues, and volatile solvent types are usually out of the question.

   Further, the adhesive in the applicators frequently has mechanical duties to perform which in themselves may call for a tacky as well as a fast-setting glue. Thus choice is greatly restricted.

The above perspective is useful in the development stage of packaging so as to obtain the full benefit from the versatility of the applicator. However, in contrast to this, where a given operation is standardized the objective is to select that *specific* adhesive which will yield the most fruitful union with the machine and stock in the form of efficient and foolproof day in and day out production compatible with the field requirements.

To accomplish this, the same pattern for the elimination of types of adhesives is followed—but now, with the other factors standardized, each zone of responsibility is carefully scrutinized so as to discover the particular strategic aspect which must be favored and it is this aspect which will focus the decision.

All of this sounds complicated, but great assistance is generally given by the equipment itself which, when used with the wrong grade of adhesive, is eloquent in a protest that points to the strategic requirements. Further, if the unit has been in operation for a while, the operator becomes keenly aware of those spots that are always demanding attention and where these are linked with adhesives the final formula adjustment of the adhesive has to cater to relieving these barriers to efficiency. Here, too, the reputable adhesive supplier can be very helpful by recognizing these factors promptly and so narrowing his recommendations.

After arriving at a decision on the proper adhesive, the next issue, and the one of great concern to the operator, is how to use it to best advantage. This usually means how to secure the most favorable rate of preliminary setting. Before going into the manipulative procedures to accomplish this, the mechanism of setting should be discussed so that the operator can appreciate the reasons for the subsequent recommendations.

Mechanisms and rate of setting

On the production line, the requisite *extent* of preliminary setting which must occur within the time of tension release (i.e., the time of tension-free contact between the freshly bonded surfaces) provided by the mechanism, determines the rate of preliminary setting required.

Thus where the time of tension release appears inadequate or where the adhesive is not exhibiting a rapid enough rate of preliminary setting, relief may be had:

1. By reducing the total tension on the bond (more effective scoring, different grain direction, etc.).
2. By increasing the area glued off.
3. By making provision to increase the "setting rate" of the adhesive (by manipulation of the adhesive, the stock, etc.).
4. By providing a longer time of tension release through longer compression, or stacking time.

This again shows how the problems of adhesion are closely inter-related with other aspects of packaging.

The three basic methods by which adhesives change from the liquid to the semi-solid state are:

I. *Increase in the concentration of the solid ingredients.* This increase in the proportion of solids to solvent which causes bodying up is brought about by

1. *Partial evaporation of the "solvent"* (which usually accompanies "tempering") prior to bringing the surfaces together. As this evaporation of solvent from the freshly gummed-off surface is generally slow, it may be promoted by the use of an air current, or heat. This expedient is most frequently used with lacquer and similar slow setting types of adhesives on relatively non-porous surfaces, thus evaporating a large amount of solvent and effecting partial preliminary setting at the time of bonding.
2. *Solution of a part of the surface itself in the adhesive.* This offers possibilities where the resultant mixture is itself an adhesive. An example is met where lacquer adhesives are used on acetate tissue where



The importance of good adhesives cannot be over-emphasized today, for the vast bulk of packaging is for military and Lend-Lease purposes. Under the best of conditions—even disregarding temperature and humidity variations, floating ashore at some isolated island bridgehead—military packages must stand up under severe shipping conditions. These corrugated packages and their adhesives must be able to "take it" without failure. Photo U. S. Army Signal Corps

solvent action on the acetate helps to body up the adhesive. This is worth consideration in the design of coatings for non-porous surfaces.

3. *Preferential removal of "solvent" from the adhesive by the stock.* This means that the surface has the ability to absorb or adsorb certain liquid or solvent ingredients either preferentially or faster than other components, thereby tending to increase the body of the surface film of adhesive. This process, commonly associated with aqueous adhesives on paper surfaces, follows two main patterns:
   a) "Seepage"—where the volatile liquid is present as a continuous phase—which is usually relatively thin bodied, while the adhesive particles are dispersed therein. Thus when spread onto absorbent paper, the liquid part drains off *into the fibres* and/or through the pores if these are small enough to restrain the passage of the semi-solids.
   b) Preferential migration of certain liquid ingredients—which occurs in the fibres of paper. Thus consider an individual fibre. (See Fig. 5.) Shortly after the adhesive is applied an increase in its concentration occurs resulting in an increase in viscosity or body, and frequently in an approach to the plastic or semi-solid state.

II—Change of temperature:

1. May increase or decrease the body of the adhesive. However, most glues thin out on heating. Thermoplastics exploit this mechanism practically exclusively though it may be used in conjunction with many cold aqueous adhesives.
2. May accelerate or retard some auxiliary physical change, e.g., evaporation of a volatile "solvent" leading to bodying-up.
3. May bring about or accelerate a chemical change that does not occur at room temperature and so body-up the adhesive.

III—Chemical change may body-up adhesive through:

1. Interaction between the ingredients and the adhesive. This may be accelerated by temperature.
2. Interaction between the ingredients in the adhesive that are catalyzed by the surroundings.
3. Interaction between the adhesive and its surroundings: often caused by ingredients in the adhesive.

The compromise called "Commercial Success"

The foregoing discussion brings out clearly that the achievement of successful adhesion always involves a number of factors, prominent among which are the nature of the surface, the field requirements and the machine factors. This all vindicates the policy of the progressive consumer of obtaining team work between machine designer, fabricator of material and adhesive supplier.

Further, as it often is the duty of the adhesive to perform more or less mechanical responsibilities while still yielding clean, efficient production at the maximum rate, these factors in themselves have to be balanced against each other in the process of formulation of the adhesive—placing stress on the major demands of the situation and compromising on other details.

This concept of a "balanced formula" is really the final focus of decision to yield optimum commercial results on the equipment. Ample evidence of this is found in the large number of adhesives of each type made by responsible manufacturers—each "balanced" around a given operation.

New developments in adhesives

by D. V. Williamson

Probably one of the most important developments in the use of adhesives in recent years is the ever-growing realization by production users of these products that, for the best final results, adhesives should be very carefully selected, that all the factors entering the picture should be borne in mind. Very frequently this means development of new adhesive products.

After all, this should not be surprising. A machine designer, for instance, feels free to make use of any metal or material that will best suit the particular function of any given part. In the item of steel alone, the designer goes to great lengths in insisting upon analysis, strength, hardness, resistance to shock and many other items. In other words, the designer calls for the metals and the detailed treatment of the metals which he needs so that his finished machine will be the best he can produce for the purpose. Adhesives, in production-packaging operations, should be selected with as much care as goes into the design of the machines on which they are to operate.

No production packaging machine can operate to give best results unless the adhesive used is perfectly adapted to the machine and to the adhesive operation from that point on throughout the normal life of the package.

When consideration is given to the varying factors that come into play in adhesive operations—such items as different kinds of paper or board or cellophane, and such diverse matters as odor, color, speed, penetration, water resistance, to mention some of the more obvious ones—is it any wonder that adhesives should be carefully selected?

Water-soluble adhesives—The great majority of adhesive operations on packaging machines is performed with water-soluble adhesives. This type offers several advantages, such as the ability to dilute the adhesives with water when desirable and to clean the machines with water. Water-soluble adhesives, however, can only be used under certain conditions and for certain purposes.

Water-resistant adhesives—Because of the demands of war in export shipments, there is need for great water-resistance in adhesives used for sealing export shipping cases. To obtain this water resistance, raw materials must be used that are resistant to water. Such materials are usually of a type that are not soluble in water but are soluble in non-aqueous solvents, as, for example, alcohol or acetone.

Emulsion-type adhesives—The use of non-aqueous solvent adhesives on case-sealing machines gives considerable trouble, chiefly from evaporation of the solvents. To avoid this, emulsion-type adhesives are now being extensively used. These offer the advantages of water-soluble adhesives in that they may be diluted with water and machines cleaned with water and yet, after the water has evaporated as the adhesive sets, the resulting film is highly resistant to water.

Emulsion-type adhesives perform well in such operations, and no heat is necessary in their use. Such adhesives will very probably have usefulness after the war where water resistance is necessary as, for instance, in many packaging operations with moistureproof cellophane and metal foil.

Emulsion-type adhesives are made using many kinds of synthetic resins as bases. They have a wide range of usefulness. In many cases they offer water resistance and flexibility to compare with rubber-latex type adhesives.

Thermoplastic-adhesive method—Another type of adhesive operation that is gaining in usefulness in packaging operations is the thermoplastic-type of adhesive joint. In this operation, the adhesive is applied to one surface and allowed to dry in the same manner—for example, on ordinary gummed labels. The adhesive bond, however, is not made by moistening the surface, but rather by placing the gummed surface against the surface it is to bond to and then pressing with heat—usually with an electrically heated plate.

This thermoplastic method offers several advantages. Obnoxious odors which may have been in the solvents of the original liquid adhesive are eliminated. The solvents disappear as the adhesive film dries. Also instantaneous adhesion is secured because the film takes hold immediately as it is softened and made tacky by the heat and pressure. This method is useful in some laminating processes.

Remoistening label—A third type of adhesive action which is very useful, particularly in spot labeling metal surfaces, is a remoistening type of label where the adhesive film is moistened with alcohol rather than water. When this type of film (which is impervious to water) is moistened with alcohol, instant adhesion is secured to metal. No heat is necessary. The resulting joint of the label to metal (tin or steel, whether plain metal or coated) is dependable and permanent, and is unaffected by dampness or moisture.

An interesting and useful point in regard to this type of remoistening label is the fact that the label has no tendency to block or curl—and the adhesive does not rust or corrode metal in any way.

Beware of false economy

With different kinds of adhesives and different types of adhesive operations there will, of course, be some differences in costs. But, on production packaging operations, all adhesives have one thing in common: their cost is a very small part indeed of the cost of the finished package. The adhesive cost, in nearly every case, is so small that the production manufacturer can only afford to consider the use of adhesive products which do their work thoroughly and with a minimum of operating trouble and expense. Any other type of adhesive would be too expensive to use even if it cost nothing per pound.

Resin adhesives

by Dr. F. C. Campins

The natural resinoid or non-crystalline materials such as starches, proteins, the natural gums, shellacs, latices, natural resins, etc., are the foundation stones of adhesive formulation.

All these raw materials require physical or chemical processing, needing also solvents, plasticizers, etc., to produce the unique combination called a "balanced formula" which keys the adhesives to the special job requirements.

The more progressive adhesives manufacturers, always sensitive to the needs of packaging, developed "lacquer types" of adhesives utilizing the synthetic cellulose derivatives along with other resins, as these non-aqueous products are needed to wet and bond many of these synthetic or plastic sheetings.

The accelerated progress in the past few years in the preparation of many new types of synthetic resins—aimed largely at the manufacture of "plastics"—has provided the adhesive industry not only with new problems in packaging adhesion but also with new tools to attack those problems. The adhesive phase of this development has naturally been accelerated by the needs of the war effort and its global requirements which brought out forcibly the versatility of these materials and their adaptability, through proper formulation, to packaging production.

Types of synthetic resin adhesives

As mentioned in Table 1 (insert chart opp. p. 380), these adhesives fall into the same types as other packaging adhesives. Thus:

A. Solvent types

1. Aqueous solutions or emulsions having the aqueous phase continuous. These usually behave as other aqueous glues, but have more versatility.
2. The non-aqueous types—which resemble lacquers or have a non-aqueous solvent as the continuous phase for surfaces not wettable by water.

B. "Cement" types

1. Thermoplastic cements. These are usually non-aqueous.
2. Chemical cements. These are the thermosetting types and may be aqueous or non-aqueous. Some of these have limited use as they often harden and insolubilize relatively soon after preparation for use.

"Synthetic" does not connote an inferior substitute, but rather materials capable of molecular manipulations during manufacture which provide the most desirable chemical structure needed for each specific end use. Through controlled processing, these "synthetics" can be made to vary by small increments over a wide range of properties. Thus the formulation of the adhesive, started in a sense in the molecular formula of the basic ingredients, can be geared to the requirements of the job from both the physical and chemical standpoints. This offers many potentialities, a few of which are discussed herein while others may have to await the postwar period for their disclosure.

Special properties and potentialities

The emulsion types are usually *very fast setting*, often more so than other cold aqueous adhesives as their aqueous phase is usually "blotted up" by absorbent surfaces.

Further, by proper formulation many unique effects can be achieved, thus the dispersed phase may contain solvents, plasticizers, etc., which may effectively act on a surface not wettable with water. They can therefore often bond dissimilar surfaces which would otherwise need lacquer-type adhesives. This feature is illustrated in Table I (chart opp. p. 380), where the adhesive acts first as an aqueous product and then as a non-aqueous product to play its dual role.

Such an adhesive may also be used to coat a paper surface, and the resultant film of adhesive, dependent upon its formulation, may have one or more of the following properties:

1. Lingering tack, sealing like surgical adhesive tape
2. Pressure sensitivity, and so seal to another similarly treated surface like the "self-seal" envelopes
3. Thermoplasticity, and so be heat activated at the time of sealing
4. Solvent-solubility in a non-aqueous solvent and so be "remoistened" with such a product to then form a water-resistant bond
5. Thermosetting properties, and so be rendered unaffected by heat after heat sealing

Further, the paper or absorbent surface may permanently break the emulsion and/or provoke polymerization changes that develop high-water resistance, etc.

Many of these properties may likewise be achieved through the use of thermoplastic hot melts offering possibilities for protective adhesive "dips."

Hot melts may be formulated having unusual temperature tolerances and so retain their plasticity over wide temperature extremes and such adhesive bonds provide protective barriers against moisture, contamination, etc.

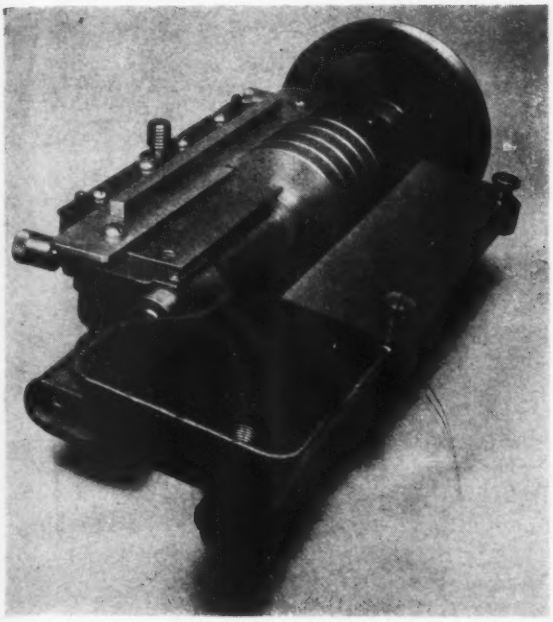
The thermosetting synthetics so widely used today in the manufacture of V-board are often of limited use in packaging operations due to their short working life. However, any generalization would be premature.

The synthetic resins thus extend the versatility of packaging adhesives formulation, resulting in products that more accurately fit the job requirements and so yield higher production rates on packaging equipment—factors which every production man should seriously consider.

Equipment for applying adhesives

by D. V. Williamson

1



1. Roll-type gum pot for labeling machine provided with electrical heating element and thermostatic control. It handles hot or cold adhesive. Cans rolled over discs pick up spots of gum which, in turn, pick up the label. 2. Chain-type gum pot for labeling machine. Chain passes through the gum pot, picks up the proper quantity of adhesive for application to the container. It is adjustable for containers of various sizes. 3. Glue pot for carton-sealing machine. Uses cold glue, applies adhesive to large areas, is adjustable. Photos Standard-Knapp Co.

Probably no two experts at golf have exactly the same form. Each player has his own individual stance and swing, and no two are identical. However, all good golfers have one thing in common: whatever their form and however they swing their clubs, the club head must do what it should do—at the point of contact with the ball. With adhesive operations in industry, there are many methods for applying the adhesives, and they differ widely in form. However, whatever methods are used, they all have one essential requirement: the application of adhesive in liquid form at the proper time and place.

Let us consider for a moment this somewhat elusive word "adhesion." It is true that in many operations the adhesive performs its functions so silently and reliably that its work is taken for granted—like the air we breathe.

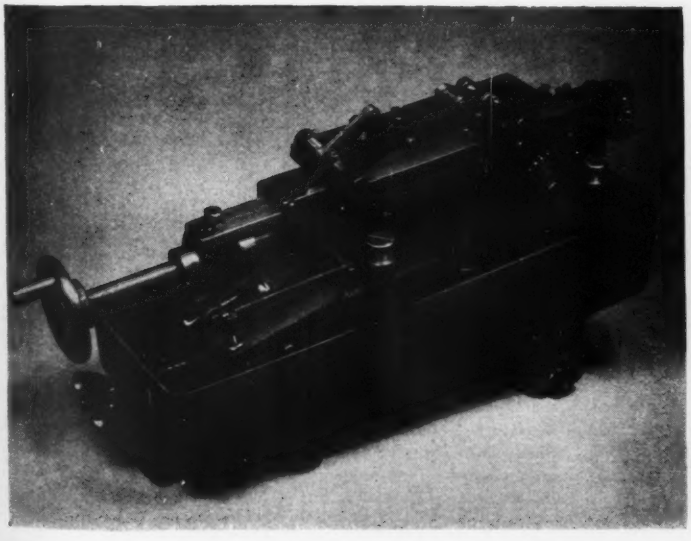
Which adhesive? Which method?

However, as new and ever-changing packaging materials come into use, and as production speeds constantly climb up and up, situations arise where, to obtain best possible over-all packaging performance, the type of adhesive to use and the method of application must be given full consideration.

Indeed, the type of adhesive and the method of applying it must go hand in hand. In the building of new packaging equipment, the machine designer would be well advised to learn fully about adhesive possibilities as the design goes along. Sometimes the conventional roller-application method may be best, while in other circumstances application by spraying or thermoplastic adhesion may be far more efficient.

A discussion of some of the methods of applying ad-

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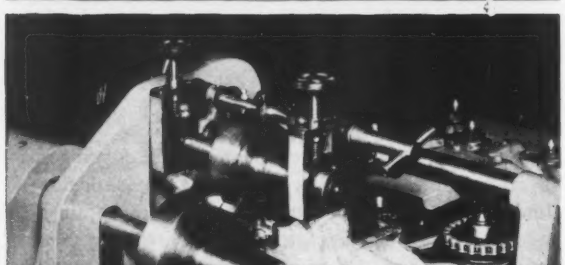


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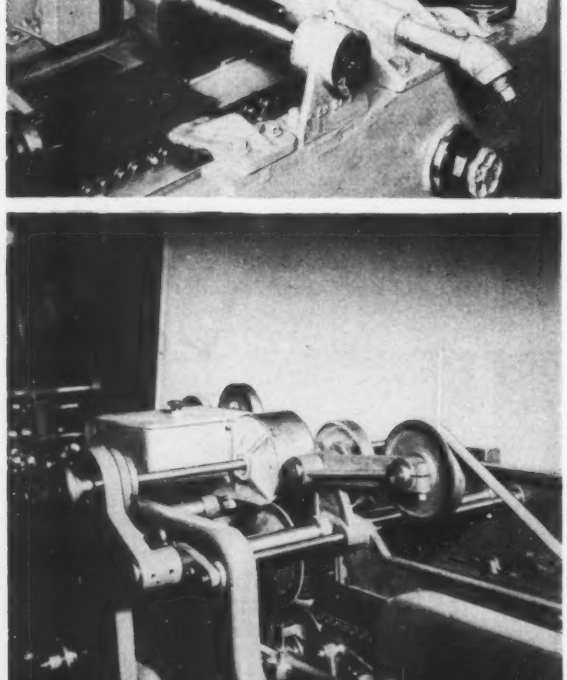




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hesives by the use of packaging equipment is given in following paragraphs.

Brushing

The hand brush is a method of applying liquid adhesives which is so well known that it needs little comment. It is useful where packages are not of uniform shape and where production is limited.

The tendency in brush application is towards films which are too thick. Thin films are better. With this method, boxes or cartons are frequently piled on top of each other for pressure. There are available, however, suitable pressure units.

The direct roller

On production machines, the brush method gives way to other devices which are more versatile and efficient under continuous operation.

In direct-roller application, the roller revolves partially submerged in the adhesive reservoir, and the adhesive is applied by the non-submerged portion of the roller directly to the surface to be glued. The thickness of film may be controlled by adjustment of the aperture between the roller and the adhesive reservoir, or with a doctor blade.

In general, cold liquid adhesives are usually used, but this method also allows the use of hot adhesives by heating the glue pot. Examples of this application are with the use of case-sealing, tube-winding and folding-box machines.

The transfer roller

Here the adhesive is transferred from the partially submerged roller to another roller which in turn applies it to the surface to be glued. Sometimes the transfer traverses back and forth with a reciprocating motion, as in some of the carton-sealing and bottle-labeling packaging operations.

An adhesive, to perform properly under this method, must not string or cobweb under the reciprocating action, and it must not thicken up too much from the rapid evaporative action of the transfer roller.

Stencil application

Adhesive is applied by a roller to stencils cut to the size and shape of the spots of adhesive to be applied. The stencils are on reciprocating arms which move back and forth for fresh adhesive film which they deposit at the proper place.

Examples of this are some types of bottle-labeling equipment and Brightwood box-forming machines. Adhesives, to be satisfactory here, must have heavy body, be readily transferable without cobwebbing, and must have great initial tack.

4. Glue applicator on a machine which forms, fills and seals bags which are used for packaging dry products. Photo Consolidated Packaging Machinery Corp. 5. Gluing mechanism on automatic machine for sealing envelopes. Photo Stokes & Smith Co. 6. Glue applicator of folding-box machine. Photo International Paper Box Machine Co.

XUM

Belt transfer

In this method, the adhesive is transferred from an open glue pot by means of a rapidly moving endless belt which passes through the adhesive and then over and across the surface of the label. The most familiar example is the lap-label joint employed when using the cylindrical-can labeler.

For satisfactory results, the adhesive must flow readily while in heavy paste form, must cut off short, and must maintain constant viscosity under the continuous agitation necessary for such operations.

Hot melt

With this type of application, the adhesive is only fluid when heated. Because of this, it sets up a thin film instantly upon touching a cold surface, and permits of rapid operation.

The familiar example is the hot pick-up gum for cylindrical-can labeling.

Dipping

Some machines are designed to have a plunger dip under the surface of an open reservoir of liquid adhesive and then deposit a dab of the adhesive at the proper place on the package. This method calls for a very thin liquid adhesive which cuts off short and is only suitable for very light adhesive operations.

Gravity or pump feed

When packaging machinery is designed to feed the glue reservoirs with fresh adhesive by gravity or pump pipeline feed, it is, of course, essential that the adhesive be of such viscosity that it will flow suitably.

Capillary action

On some delicate operations, the thin liquid adhesive is brought up to the point of contact by capillary or wick action. An example of this is the application of solvent for the sealing of moistureproof cellophane in the packaging of cigarettes.

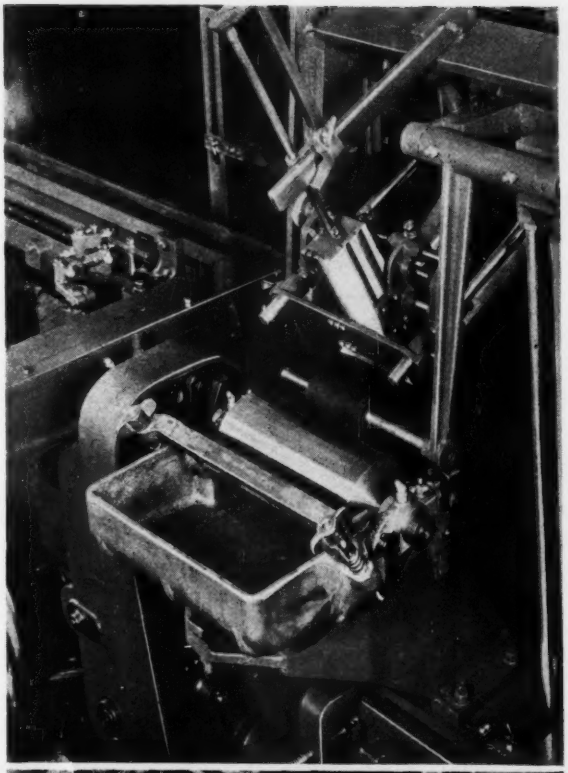
This method is only suitable in using liquid adhesives free of solid matter; otherwise, the pores in the wicks would clog up and fail to deliver.

Remoistening

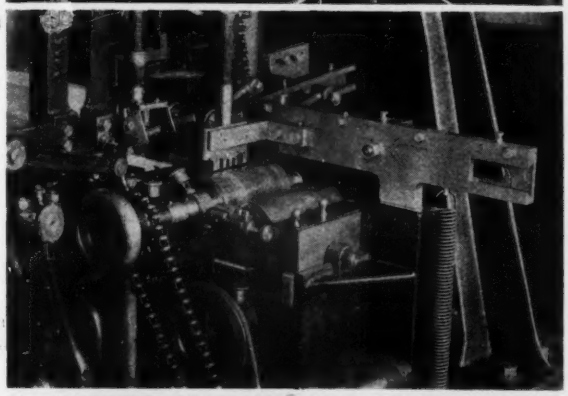
Remoistening is used with pregummed surfaces, as on bags, envelopes, gummed sealing tape and some types of bottle labeling. The gummed surfaces are moistened with water just prior to application. Gummed surfaces moistened with water do not, however, hold well to tin or metal.

However, in this connection, it is interesting to note that a new type of remoistening gum which is moistened

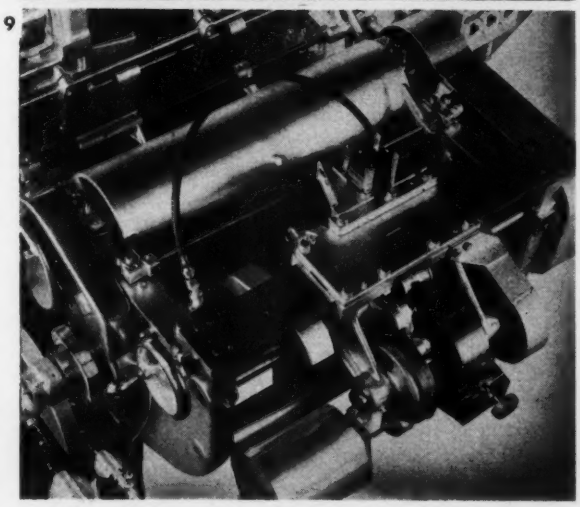
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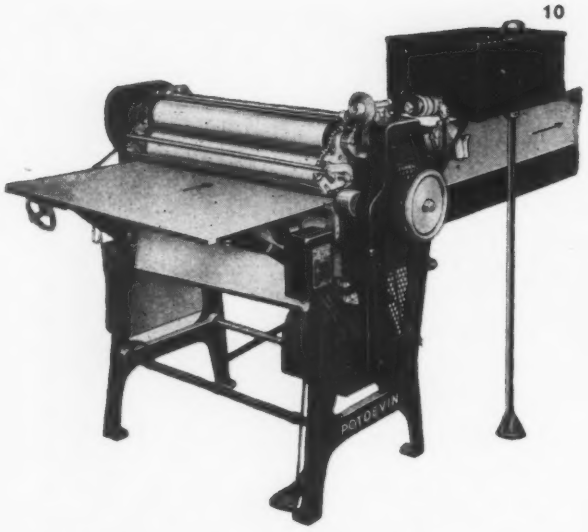


7. Bottle-labeling machine has adhesive-mechanism assembly. Photo Economic Machinery Co. 8. For affixing labels, a cigarette-packaging machine is equipped with this gluing device. Photo Arenco Machine Co. 9. Glue receptacle, transfer roll and label magazine on cake-wrapping machine. Photo Battle Creek Bread Wrapping Machine Co.

XUM

XUM

10



10. Flat sheets are fed into conveyor gluer at 40 per minute, emerging on conveyor. Photo Potdevin Machine Co.

with alcohol instead of water does hold spot labels to tin or metal with a strong, permanent bond.

Thermoplastic adhesion

With this method, the surface has also been pregummed in the same fashion as with ordinary gummed labels, but a different type of adhesive is used. Adhesion is secured by pressing down electrically heated plates at the point of contact. The heat instantly makes the thermoplastic adhesive liquid, and instant adhesion is secured.

This method is useful for some types of bag and envelope closing, for laminating, and for certain types of labeling. One distinct advantage is that the solvents in the original adhesive are not present in the dried film used. These solvents are frequently inflammable and of objectionable odor.

Spraying

This method is sometimes used to apply adhesives in locations and under conditions where no other method will operate. Spraying is successfully used, for instance, to apply highly volatile and fast-acting adhesives in the sealing of filled bags of foodstuffs under conditions where no other method of application would answer.

Chemical attraction

In addition to the different methods of applying adhesives on packaging machinery, some other factors involved in the operations should be mentioned.

In any adhesive operation, the adhesive should be chemically attracted to both surfaces it must join together. If this does not obtain, failure may result. This is an item of increasing importance as new finishes on paper, new plastics and new metal surfaces appear in the packaging field.

To illustrate this point: adhesives entirely suitable for labeling glass bottles fail in joining spot labels to tin cans. Why? The adhesive is chemically attracted to the glass, while it is repulsed by the tin.

Pressure

Generally speaking, the greater the pressure the faster and better the adhesion. The pressure forces the adhesive into the pores and fibres of the label or paper or board. Of course, pressure must be kept in line—it cannot be so great as to crush a package. That brings up our next item, which is:

Time

If great pressure is not possible, then the package must be kept under pressure a sufficient length of time for satisfactory adhesion.

Let it be remembered that length of time under pressure does not slow down production at all. It simply means longer pressure units. Let it also be pointed out that the great majority of liquid adhesives used in packaging set up or take hold from evaporation of water content. On dry winter days this action is much faster than in humid summer weather.

Design the pressure unit for the worst condition—it is good insurance, and a precaution which will yield much customer good will.

Heat

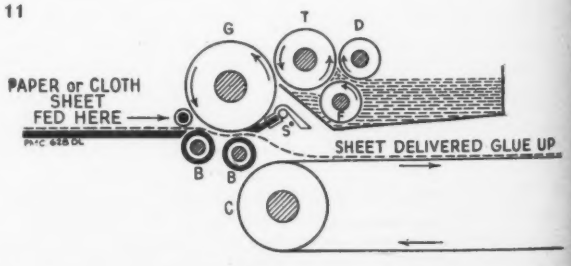
Most packaging-sealing operations are performed with cold liquid adhesives. This is the ideal type. However, in stubborn cases, or where time under pressure is very important, one or two steps may be taken to facilitate the operation by using heat. If the adhesive is suitable, heat the glue reservoir. This will frequently give faster penetration and faster adhesive action.

Apply electrically heated plates to the glued joint after the adhesive is in place. This method may be used with solvent type adhesives which could not be heated at all in the glue reservoir. It is frequently used in sealing and labeling moistureproof cellophane.

Packaging machinery and adhesives are constantly being called upon to produce with new and varied materials, and always present is the modern watchword—speed.

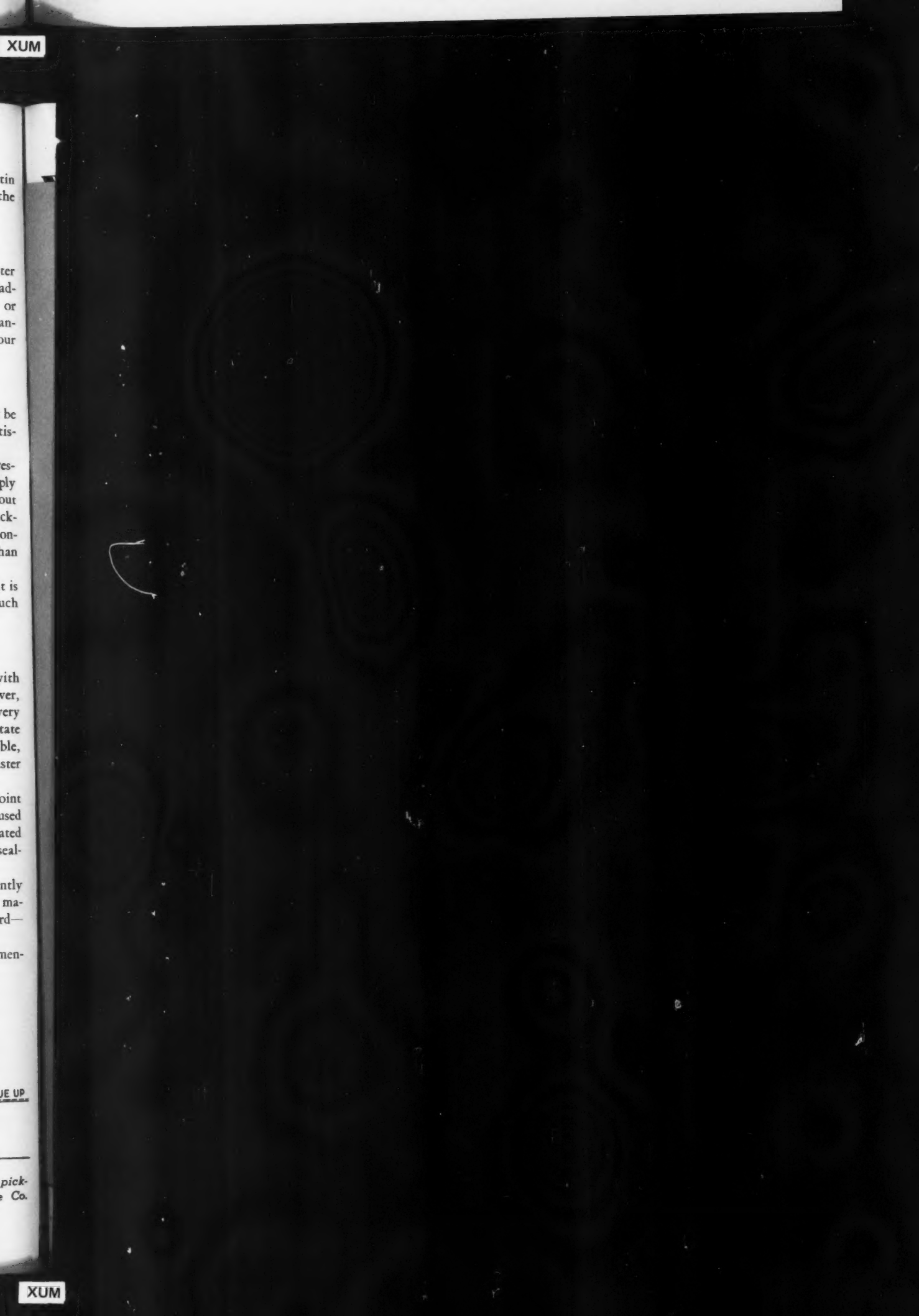
A proper consideration of adhesives will help tremendously. Give your adhesive a chance.

11



11. Diagram of machine in No. 10. Shows the glue pot pick-up and applicator rolls. Photo Potdevin Machine Co.

XUM



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ADHESIVES—CHARACTERISTICS, TYPES, PROPERTIES

TABLE 1.—CHARACTERISTICS OF ADHESIVES

A. SOLVENT (Liquid-Activated) Types: (At least one of the surfaces being adhered must permit the diffusion of the volatile liquid ingredient which usually plays no part in the final bond)

AQUEOUS PHASE CONTINUOUS			NON-AQUEOUS PHASE CONTINUOUS	
Aqueous Adhesives that are true (or nearly true) solutions	Colloidal Solutions		Lacquer-Type Adhesives that are true (or nearly true) solutions in organic solvents	Colloidal Solutions
	Of materials that dissolve and usually have an affinity for water. Usually viscous	Dispersions or Emulsions of materials that have little affinity for water, in water or in other aqueous adhesives.		
	Commercial types are:			
Slow drying Vegetable Adhesives	Most Aqueous Vegetable Glues Silicates Many Cold Protein Glues Gum Arabic	Natural and/or synthetic resin and/or rubber emulsions	"Cellu-Gums" Clear Lacquer Adhesives for transparent sheetings	Wax Gums

B. CEMENTS: (Both faces may be impervious to all vapors from solvents)

THERMOPLASTIC CEMENTS		CHEMICAL CEMENTS
Aqueous Types	Non-Aqueous Types	Synthetic Resins (Polymerization or Thermosetting Types)
Commercial types are:		
Some Flexible Animal Glues (where loss of water not necessary to the final bond)	Hot Melts	Synthetic Resins

TABLE 2.—TYPES OF ADHESION AND SUITABLE ADHESIVES

Type of Adhesion	Surface Requirements	Type of Adhesive	Used on
Penetration Bond	Both surfaces must be absorbent, wettable by adhesive, and permit the diffusion of the solvents	Usually cold aqueous adhesives of solvent type that dry out to brittle films. (Any type that dries to a brittle film would utilize this type of bond)	Porous Materials } Open Paper Stocks (See Note 1.)
Plastic Bond	At least one surface must permit diffusion of solvents	Solvent Adhesives that dry out to Plastic Films	Smooth, usually less porous surfaces } For Aqueous Adhesives—e.g., Glassines, Bond Papers For Lacquer Type Adhesives—Transparent Tissues
	Neither surface will permit the diffusion of solvents, i.e., impervious surfaces	Cements, e.g., Thermoplastic Adhesives	Smooth, non-porous surfaces } e.g., Foil to Itself Certain Plastics (See Note 2.)

A special case for "solvent adhesives" occurs where two surfaces of the same material are soluble in some solvent which can be used to partly dissolve the surfaces and form a solute bond or weld after the solvent has evaporated. This case merely falls in the class of solvent-activation or re-moistening as the solvent is not the adhesive. An analogous case for "cements" is where two surfaces of the same material are thermoplastic and so can be heat-activated and welded together.

Note 1: Thin films should be used as glues giving penetration bonds generally dry to inherently brittle films.

Note 2: Plastic bonds are also made between porous surfaces; glue film may be thick.

TABLE 3.—SUMMARY OF PROPERTIES AND USES OF ADHESIVES

Property of Surface	Commercial Examples	Type of Adhesive	Requirement of Final Bond	Nature of Adhesive


XUM

Property of Surface	Commercial Examples	Type of Adhesive			Requirement of Final Bond	Nature of Adhesive
		Solvent		Cements		
(Age-proofing)		Aqueous	Non-aqueous	Thermoplastics		
Neither Greaseproof nor moistureproof	Most ordinary papers, kraft papers and paperboard for converting (permit ready diffusion of water and other vapors)	Most generally used	OK for water-resistant bonds	Non-aqueous types OK for water-resistant bonds	Frequently penetration bond of low tensile strength but stronger than the stock	Generally the several types aq. vegetable glues, silicate Hot aqueous protein glues where high tack necessary
	Wood	Generally used	Usually NG	Chemical cements for water resistance	As above but need higher tensile strength to be stronger than stock	Aq. vegetable glues (occasionally) Aq. Protein Glues (e.g., Fish, Animal, Casein) Types Chemical Cements (e.g., Plywood Resin)
Greaseproof	P. T. Cellophane, Acetate permits the diffusion of moisture - vapors of organic solvents	Frequently used	OK for water-resistant bonds	Thermoplastics also OK where water resistance and no solvent odor desirable	Generally Plastic Bond	Aqueous (Latex and Vegetable) Glues and Lacquer-types adhesives most often used
	Glassine, Greaseproof Paper, Parchment (permit the diffusion of moisture but not the vapors of organic solvents)	Frequently used	NG	Thermoplastics OK	Generally Plastic Bond	Usually slow drying, aqueous vegetable glues
Moistureproof	M. P. Cellophane, M. P. Acetate lacquered glassine	NG	OK	OK	Plastic Bonds	Usually slow-drying lacquer-type adhesives
	Pliofilm	NG	OK	Material itself is thermoplastic	Plastic Bond	Usually heat-sealed to itself
Moistureproof and Organic-Solvent-Vapor-Proof	Many Plastics, Metallic Foils	NG	NG	OK	Plastic Bond	Thermoplastic resin type adhesive

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What to tell your adhesive supplier

by G. B. Cloran

Any supplier can serve his customers better if he knows their problems. Many adhesive uses are highly specialized, virtually calling for individual "prescriptions." Here are some suggestions as to what your adhesive supplier should know in order to give you the proper material:

Product considerations

Tell what the product is and submit sample if possible. What are its physical characteristics? Does it sift? Is it a transparent liquid? A brittle material? Is it hygroscopic? Does it absorb odors?

Is it packaged for stock or on special order? What is the packaging season?

What are the prevailing climatic conditions where the packaging is done?

Package material considerations

Submit several representative samples cut to exact size and indicate where adhesive is to be applied.

Paper—Is it a label, wrapper, bag? Is it kraft, bond, sulphite, glassine? Is the stock litho coated, book, antique, or otherwise finished? Is it plain, heavily inked, varnished, lacquered, dry or wet waxed, pyroxylin or otherwise coated or impregnated? Is it laminated? If so, what laminant was used . . . asphalt, wax, resin, starch paste? Is it heavily sized, calendered, embossed? Is it colored and if so, are the dyes sensitive to alkalies, acids, water? Is it trimmed accurately to size? What are the dimensions? What is the grain direction of the paper . . . parallel with or perpendicular to the printing?

Cardboard—Is it a folding or set-up box, seal-end or tuck-in flap carton, solid-fibre or corrugated case, spiral or straight-wound tube? Is it ordinary chip or straw board, clay or pyroxylin coated, dry or wet waxed, silicated or otherwise greaseproofed or moistureproofed? What point board is it? What ply? What are the dimensions? Is it colored, or plain, sized or porous, rough or smooth? Is it uniform? Is it accurately trimmed? Is it lightly or well scored?

Wood—Is it soft or hard, rough or smooth, green or aged wood? How is the surface finished?

Glass—Is it a bottle, jar, vial, ampule? Is it plain, frosted, stippled, flint glazed, opal? Is the labeling surface round, flat, convex, concave, or singular? Is it labeled wet or dry, clean or greasy? What is the temperature of the surface when labeled?

Tin—Is it tin plate, tern plate or black plate? Is it plain, lithographed, enameled, lacquered or painted? What is the shape of the container—round, square, oval, tapered? Is it clean or greasy, wet or dry? What is the temperature of the surface when labeled?

Foil—Is it tin, lead or aluminum foil? Is it backed with paper or board? (If so, describe stock and laminant as indicated above.) Is it plain or lacquered? Is it smooth or embossed? What is the foil thickness?

Molded plastics—Is it Bakelite, Tenite, Lucite, etc.?* Identify the manufacturer.

Transparencies—Is it a viscose film such as cellophane, acetate such as Kodapak, rubber-base such as pliofilm or the polyvinyl type? Is it rigid or pliable? Is it a label, wrapper, bag, box or window?

Production considerations

Type of operation—Is it spot or is it overlap labeling? Tight or loose wrapping? Carton, case, or bag sealing? Tube winding, box forming, bundling?

Method of operation—Is the adhesive applied by hand or machine? Give the make, model and manufacturer's name of any packaging equipment involved.

Type of application—Is the adhesive applied *indirectly* from a table, transfer roller, picker, dauber; or *directly* . . . by glue roller, silk screen, paste belt, paddle, force-feed device, spray?

Speed of operation—How many packages are completed per unit of time? How long is the glued area held under pressure? By what means is pressure exerted . . . compression unit, stacking, etc.?

Operating conditions—What is the packaging room temperature and humidity? Is the machinery new or in good condition? Is it suited to the work and properly cleaned, adjusted, oiled? Is the help inexperienced or skilled?

Special processing—After sealing, is the package steam-sterilized, wax dipped or otherwise treated?

Re-use—Are the empty packages returned for re-use?

Field considerations

The market—Where is the product sold . . . in what localities and climates?

Shipping conditions—What types of carriers are used . . . trucks, railroads, ships, airplanes? Is the shipping container exposed to the elements in transit? Are special shipping facilities employed (heated or refrigerated cars, etc.)?

Storage conditions—Where will the package be stored—in open spaces, cold sheds, heated warehouses, frozen food lockers? How long is its shelf life?

Consumer handling—Will the package be handled with wet hands? Will it be re-used by the consumer? Will it be placed in ice water, damp cellars, steamy bathrooms?

Laws and regulations

Must the package comply with pure food or drug regulations, B.A.I. or Government wartime specifications, or other Federal, state, trade or religious requirements?

* For types and trade names see "Plastics for Packaging", p. 321.

Make Findley's Your Source of Supply for Packaging & Shipping Container Adhesives

DEVELOPED and "PILOT PLANT PRE-TESTED" TO MEET YOUR SPECIFIC REQUIREMENTS

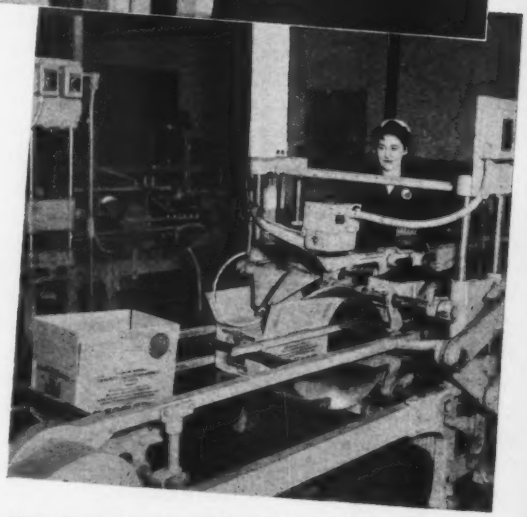


Adhesives that are entirely satisfactory for someone else's paper stock, packaging conditions and equipment may not be at all suitable for *your* set-up. What goes *into* the package or shipping container; . . . the end use to which it is put as well as all of the intermediate handling in transit, in storage and under varying climatic extremes . . . all of these are incidental factors that have a bearing on the kind of adhesives you should use.

One of the functions of Findley's "Pilot Plant" Laboratory is to analyze your specific problems . . . and then develop "Adhesive Prescriptions" to satisfactorily meet these problems. Another function is to "pre-test" such adhesives under conditions corresponding to those to which your packages or shipping containers are subjected.

Such basic characteristics as: High Water Resistance (where and when needed); Strength, Viscosity, Stability, Tack, Quick-Drying, Odor and Color Control, Non-Crystallinity, Non-Stringiness, Machining . . . these can be taken for granted in Findley's Adhesives. But it is upon a properly balanced combination of these qualities, to fit your specialized needs, that Findley's Adhesives excel.

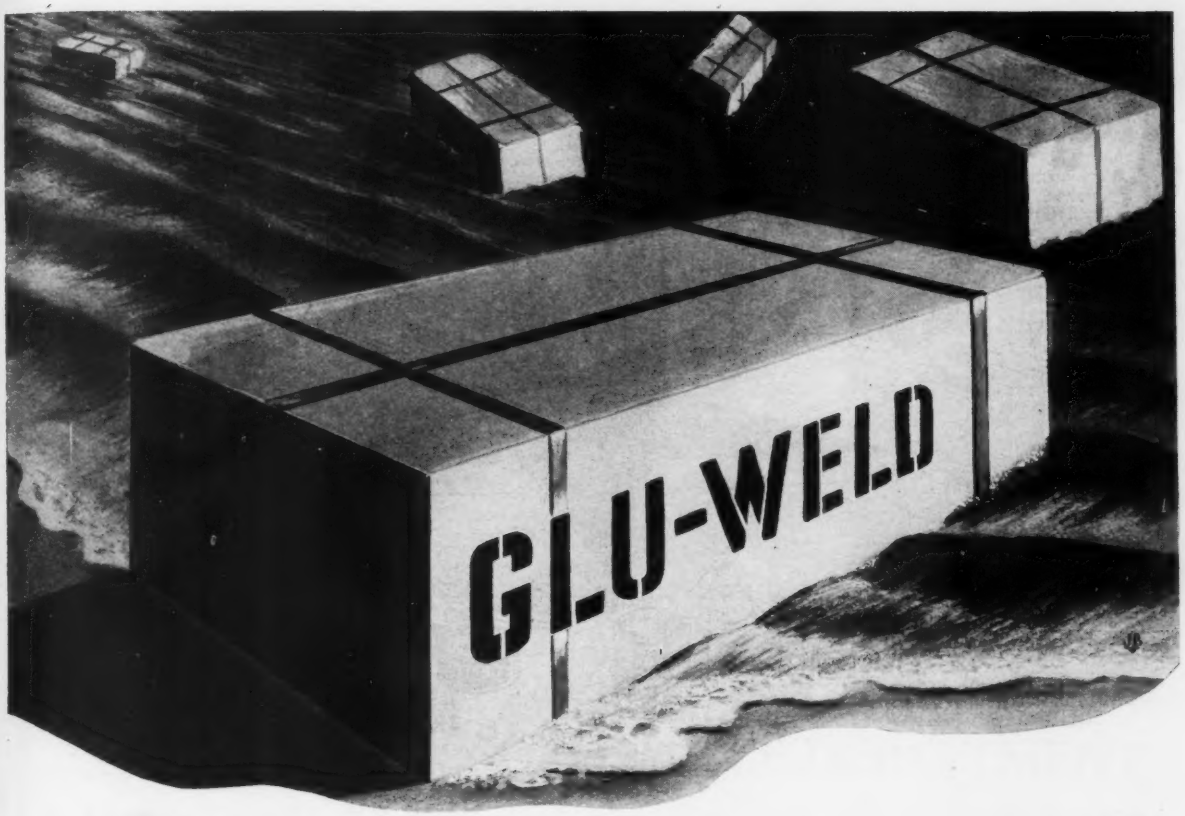
That is why we say: "Make Findley's your source of supply for Packaging and Shipping Container Adhesives" . . . or for labeling, fabrication, or any other applications in which adhesives are required in your operations. If you have a problem . . . let us do what we can to help you solve it. If you have no problem . . . use Findley's Adhesives to help prevent problems from arising. We are at your service. Write for Bulletin F-228—and also ask for free copy of Findley's Handbook on Case Sealing.



Above illustrations show typical high-speed package-filling and sealing unit, and case-sealing installation at Gerber's Products plant, Fremont, Mich., using Findley's prescription adhesives.

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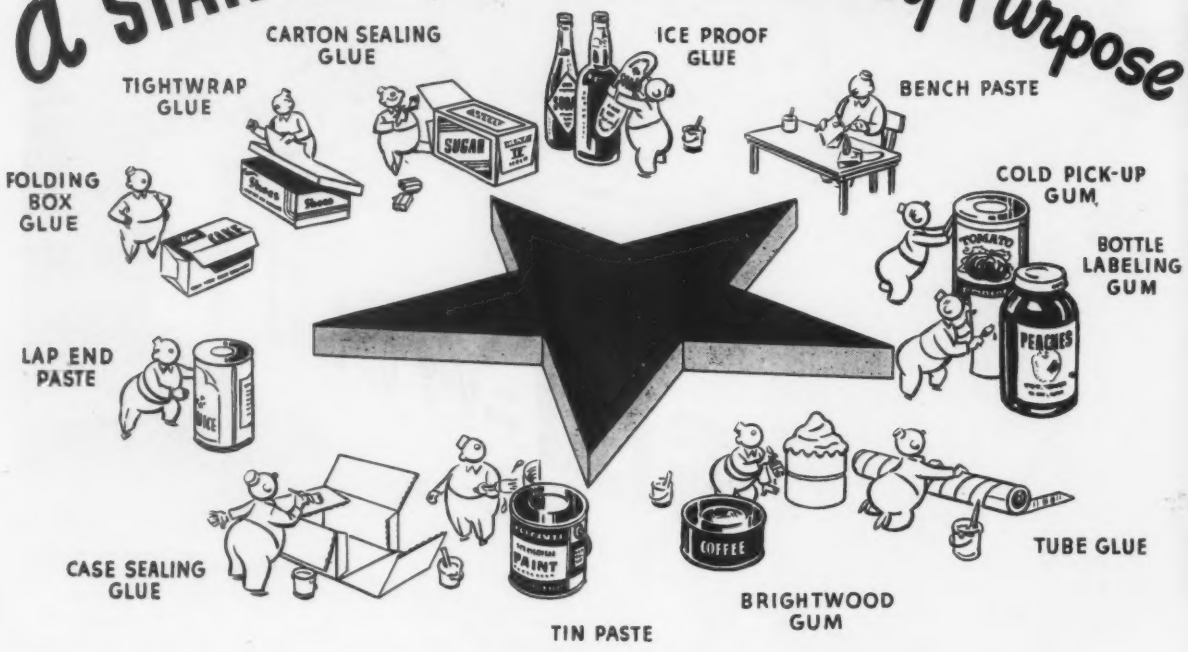


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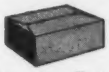
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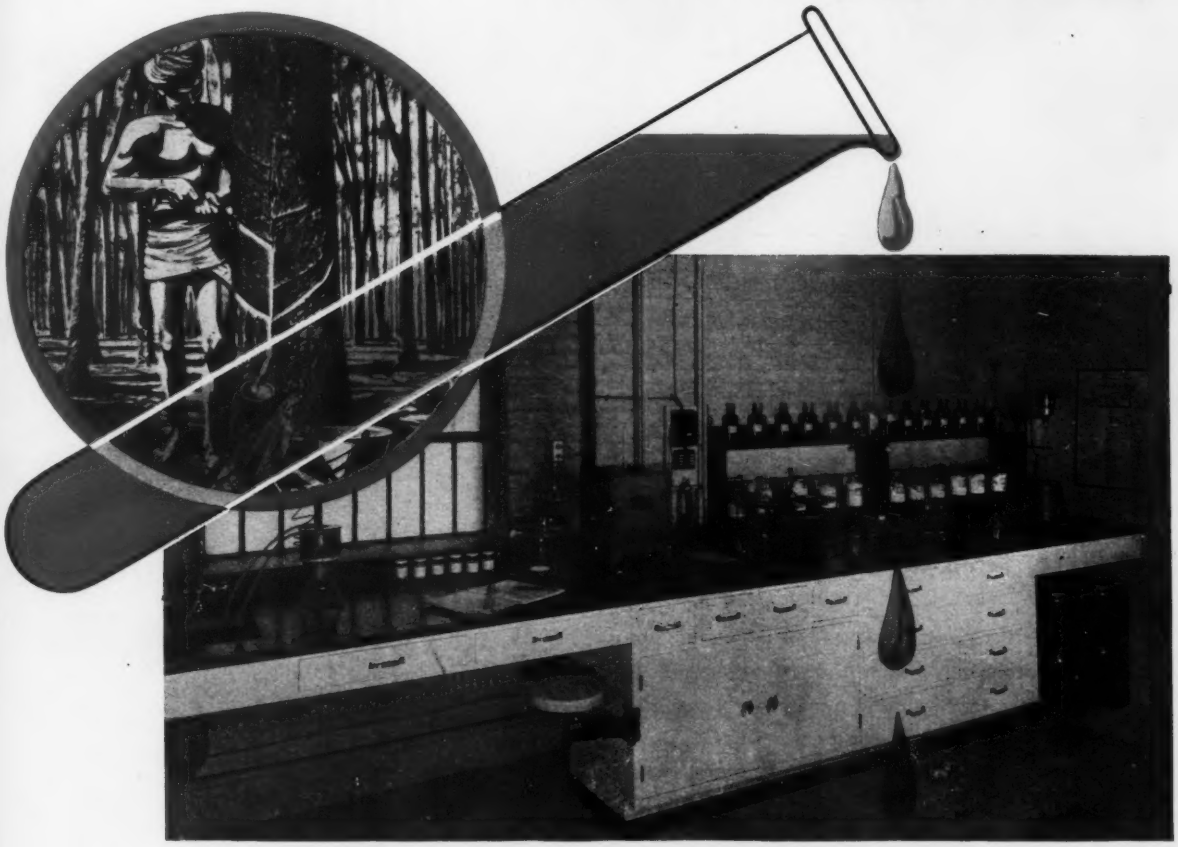
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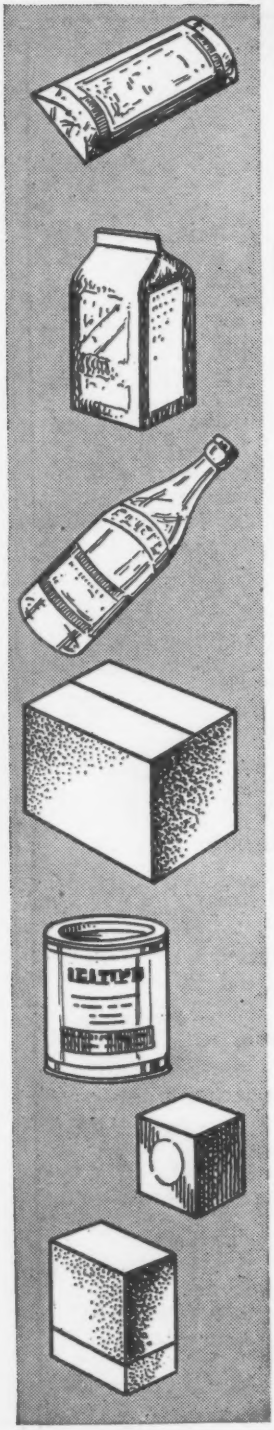
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2. ANIMAL (Flexible), FISH GLUES
(*Dry, Liquid and Cake forms*)
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3. CASEIN GLUES
(*Dry and Liquid Types*)
Water Resistant
4. SYNTHETIC RESIN CEMENTS, COATINGS AND COMPOUNDS
5. RESIN EMULSIONS and SOLUTIONS
(*Liquid, Aqueous and Non-aqueous*)
Water Resistant, Waterproof, Pressure Sensitive
6. RUBBER CEMENTS — LATEX ADHESIVES
(RECLAIM DISPERSIONS)
7. ASPHALT CEMENTS — EMULSIONS
8. WAX SPECIALTIES — SEALING COMPOUNDS
9. ADHESIVE SPECIALTIES
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  - —Paraffined and Waxed Cartons
  - —Set-Up Paper Boxes
  - —Paper Cups, Bottles, Tubes
  - —Fibre Bodied Cans
  - —Paper Bags, Multiwall, Duplex, Asphalt Impregnated Transparent, Metal Foil, Textiles, etc.
  - —Envelopes and Packets.
- PAPER DISPLAY AND ADVERTISING SPECIALTIES
  - —Counter Cards
  - —Giant Packages
  - —Merchandising Deals
- METAL CONTAINERS
  - —Tin Cans and Boxes
  - —Decorated Metal Cans
  - —Aluminum and Specialty Metal Containers and Tubes
- GLASS AND CERAMIC CONTAINERS
  - —Bottles, Jars, Vials, Tubes, Ampoules
  - —Pottery
  - —Vitrified and Stoneware
- WOOD, LEATHER BOXES
- PAPER WRAPPINGS
  - —Wrapping Paper, Asphalt impregnated and laminated
  - —Parchments
  - —Glassine and Transparent Sheetings
  - —Foil Papers
  - —Waxed Papers, Treated Papers
  - —Protective Pads and Cushions
- PAPER LABELS, TAGS, SEALS
  - —Printed, Lithographed, Varnished, Lacquered, Foil, etc.
  - —Shipping Instruction Labels
  - —Package Folders

PAISLEY ADHESIVES CAN BE SUPPLIED FOR:
- —Machine application
- —Hand brush application
- —Spray application
- —Spreader application
  - . . . and may be applied
  - . . . either hot or cold.

- PACKAGING MACHINES
  - —Bar Wrapping
  - —Bundle Wrapping
  - —Carton Sealing
  - —Case Sealing
  - —Tightwrap Sealing
  - —Paper Tube and Can
  - —Bottle Labeling
  - —Can Labeling
  - —Bag and Envelopes
  - —Label Gumming
- PACKAGE PRINTING AND MANUFACTURE
  - —Folding Box Machine Adhesives
  - —Set-Up Box Glues
  - —Paper Bag Machine Adhesives
  - —Non-Offset Spray Solutions
  - —Protective Coatings
  - —Laminating Adhesives
- MOLDED PLASTIC CONTAINERS
  - —Boxes, Caps, Cabinets, etc.

PAISLEY LABORATORY SERVICE: ANY MANUFACTURER who wishes to receive the recommendations of the PAISLEY LABORATORIES on any particular labeling, sealing or adhesive problem should write for the *Paisley Adhesive Problem Data Sheet.* This service is available without obligation to all industries.

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Chart: Properties of Functional Packaging Materials
Opposite 392

Functional packaging materials

by C. A. Southwick, Jr.

The chart of "Properties of Functional Packaging materials" (see the insert chart) briefly tabulates the more important data of the basic materials and a few of the many possible combinations and treatments. This chart does not indicate new trends, the reason for combinations or the uses of the material listed. The following paragraphs supply such facts and give a better over-all picture of each class of materials.

Transparent films

In spite of wartime restrictions, two new films have appeared and are being used for special war purposes. One of these films, vinyl, was not previously unknown—it had been produced semi-commercially before the war—but this film is now in volume production by several companies. The other film, vinylidene chloride, was accelerated from the test tube to limited production because of its unusual durability and protective qualities.

The uses and production of transparent sheetings were rapidly expanding in the years before war curtailment. Not only was this development reaching new highs in the volume of production, but also in the number of forms and types of older materials and in the number of generically new sheetings.

The first cellulose sheetings were non-moistureproof and had variable physical properties. By 1942, cellulose sheetings with a wide range of moistureproofness and in many modifications were being made for specific uses or product needs. Unfortunately, wartime restrictions on critical chemicals and equipment have reduced the number of types of cellulose films and stopped or limited production of other kinds of films. Civilian uses of all transparent materials have been defined, limited or even forbidden, depending upon the essentiality of the product, the end use or the films.

War demands increasing quantities of films for jobs requiring special properties and functions. As these war uses expand, it is obvious that the amount of sheeting available for consumer uses will be reduced to only the most essential needs. Also the shortages of pulp and labor may cause further reductions in civilian supplies of films.

In such cases, transparent films are now being used because they meet functional needs and not because they happen to possess clarity and decorative appeal.

Regenerated cellulose films

This type of material comprises the bulk of the transparent films in production today. It is transparent, colorless, slow burning and affected by changes of the humidity in the atmosphere. The fact that this base is hygroscopic, or water-wettable, makes it possible to use the film for products having high fat content, but it also results in a film which has no moistureproofness. The most widely used form of regenerated cellulose sheeting is that with a coating of moistureproof lacquer. The moistureproof film is used in much greater quantities than the uncoated film. Because the function of the resulting film is a property of the lacquer coating, it is possible, by varying the lacquer composition, to produce films having high or low moistureproofness and with or without heat-sealing properties. However, if the film is to be used in contact with free water, it is usually necessary to use a so-called anchored coating which is especially made to give better adhesion of the lacquer to the cellulose base. Many of the modifications of cellulose films depended upon changes in the degree of plasticization to meet the needs of a particular product or packaging machine.

As a result of the demand for increased moistureproofness and greater toughness and strength, there has been a great increase in the volume of cellulose films which have been laminated to each other or to other materials—paper, metal foils, etc. The addition of a suitable laminating agent can improve the physical properties markedly, and the resulting film has found many war applications. Such films are being used for large units of dehydrated foods, for field-ration units and for obtaining resistance against war gases.

Cellulose acetate

Cellulose acetate had been increasingly used in our peacetime economy because of its dimensional stability under varying atmospheric conditions. It also possesses other physical properties which made it suitable for use in rigid transparent containers. Cellulose-acetate films differ radically from regenerated cellulose because the acetate base is water-insensitive and can only be put in solution by certain solvents. Its manufacture is more involved, and since its base material is usually cotton linters rather than wood pulp, it is higher in cost than regenerated cellulose. The acetate film is unusually brilliant and clear, but possesses no useful degree of moistureproofness. Because of the effect of some organic solvents on the film, and because of the poor adhesion of lacquer coatings, it is not usually lacquered, although the result would be a film of excellent moistureproofness. Cellulose-acetate film is very stable to dimensional changes with varying atmospheric humidities. As a result it has been widely used as windows in cartons, bags, etc., and as a surface layer when laminated over decorative and printed papers and fibreboards. Cellulose acetate has good stability against outdoor exposure and when laminated to cotton scrims, has been used as a glass substitute. It is now finding war uses as a laminated material in connection with various cloth



PROPERTIES	
GENERAL	
Type of Material	
Forms Available	
Clarity	
Thickness Range, in.	
Maximum Width, in.	
Area Factor, sq. in. per lb.	
Specific Gravity, approximate	
MECHANICAL	
Tensile Strength, lbs. per sq. in.	
Elongation, per cent	
Bursting Strength (Mullen) lbs. per sq. in.	
Tearing Strength (Elmendorf), grams	
Folding Endurance	
CHEMICAL	
Water Absorption in 24-hr. Immersion Test, per cent	
Moisture Vapor Permeability,[3] grams/24 hrs./100 sq. in. at 100 deg. F. 95% R. H.	
Permeability to Gases	D
Resistance to Acids	P
Resistance to Alkalies	P
Resistance to Greases and Oils	
Resistance to Organic Solvents	
PERMANENCE	
Resistance to Heat (Limiting Temp.), ° F.	B
Resistance to Cold (Limiting Temp.), ° F.	
Resistance to Sunlight	
Dimensional Change at High R. H., per cent	
Resistance to Storage	D
Flammability	Sa
Manufacturers	

PROPERTIES OF FUNCTIONA

The values reported in this Chart were obtained from various sources and are believed to represent acceptable commerc

Manufacturers should be consulted for additional special information or for new uses of their materials. Be

	CELLULOSE DERIVATIVES					VINYL RESINS			
	Cellophane Plain	**Cellophane Moistureproof**	**Cellophane Moistureproof Anchored**	**Cellulose Acetate**	**Ethyl Cellulose**	**Vinyl Films Vinyl Chloride or Vinyl Cl and Ac.[4]**	**Vinyl-Coated Paper[4]**	**Saran**	
	Regenerated cellulose	Lacquered regenerated cellulose	Anchored, lacquered regenerated cellulose	Cellulose acetate	Ethyl cellulose	Vinyl resins	Vinyl resins on paper	Polyvinylidene chloride	
	Sheets & rolls	Sheets & rolls	Sheets & rolls	Sheets & rolls	Sheets & rolls	Rolls	Rolls	Seamless tubes, rolls	Cont
	Transparent	Transparent	Transparent	Transparent	Transparent to opaque	Transparent to translucent	Opaque	Transparent	Tra
	0.0008–0.0015	0.0009–0.0017	0.0009–0.0017	0.00088–0.0015	0.001–.020	0.001 or more	Resin 0.001 or more	0.00125–0.00225	Nor Ter
	44	44	44	48	25	40	40	24	
r lb.	12,400–23,400	11,600–21,000	11,600–21,000	14,600–25,000	24,300 or less	2,300 or less	—	7,200 — 13,000	
ximate	1.45	1.40–1.55	1.40–1.55	1.25–1.35	1.14	1.14	1.40	1.68	
per sq.	—	—	—	—	10,000	—	—	7,000–11,000	U
	15–25	15–25	18–25	20–35	30	—	—	25–35	
Mullen)	—	—	—	—	48	—	—	67	
Elmen-	2–10[1]	2–10[1]	2–10[1]	2–5	7	—	—	40	
	—	—	—	—	4,000	—	—	Over 500,000	10,00
24-hr. cent	High	High	Low (water repellent)	3.5–8.0	2.6	Negligible	—	None	0.
ability,[3] g. in. at	High	0.2–0.6	0.2–0.6	High	High	High	High	0.20 or less	
	Moist: Low Dry: Impermeable	Immeasurable[2] Impermeable[3]	Immeasurable[2] Impermeable[3]	Low[2] Impermeable[4]	Depends on R. H.	—	—	Very low	6–85 100 hr 100–1,50 100 hr
	Poor resistance to strong acids	Poor resistance to strong acids	Poor resistance to strong acids	Poor	Weak and fair	Good	Good	Excellent, except H_2SO_4 and HNO_3	
	Poor resistance to strong alkalies	Poor resistance to strong alkalies	Poor resistance to strong alkalies	Poor	Excellent	Good	Good	Good except NH_4OH	
and Oils	Impermeable	Impermeable	Impermeable	Good	Good	Good	Good	Excellent	
ic Sol-	Insoluble	Insoluble	Insoluble	Soluble, except in hydrocarbons	Soluble	Soluble in some	Soluble in some	Good	Sol chlor
imiting	Begins to char at 375° F.	Begins to char at 300° F.	Begins to char at 300° F.	150° F.	275° F.	Softens at 200° F., melts at 230–295° F.	180° F.	170° F.	
imiting	Depends on type and R. H.	Depends on type and R. H.	Depends on type and R. H.		—75° F.	—	—40° F.	—20° F.	
t	No effect	No effect	No effect	Good	Excellent	No effect	Good	Excellent	
at High	3–5	3–5	3–5	Slight	Very slight	None	—	None	
	Deterioration due to age is negligible, provided proper storage conditions are maintained			Good	Excellent	No change	Good	Good	Go
	Same as newsprint	Same as newsprint	Same as newsprint	Nonflammable	Moderate	Slow burning	Slow burning	Self-extinguishing	
	E. I. du Pont de Nemours & Co., Inc. Sylvania Industrial Corporation			E. I. du Pont de Nemours & Co. Inc. Celanese Celluloid Corp. American Products Mfg. Co. Tennessee Eastman Corp.	Dow Chemical Co.	B. F. Goodrich Co. Carbide & Carbon Chemicals Corp. Goodyear Tire & Rubber Co.		Dow Chemical Co.	Goodye

METAL FOIL LAMINATIONS

PROPERTIES OF FUNCTIONAL PACKAGING MATERIALS

n this Chart were obtained from various sources and are believed to represent acceptable commercial standards. Special grades of some of these materials may be obtained which excel in
rers should be consulted for additional special information or for new uses of their materials. Because of wartime restrictions, some of the materials listed in the chart may not be avail

	VINYL RESINS			RUBBER BASE PRODUCTS		WAX BASE PRODUCTS	
Ethyl Cellulose	Vinyl Films Vinyl Chloride or Vinyl Cl and Ac.[4]	Vinyl-Coated Paper[4]	Saran	Pliofilm	Cry-O-Vac	Parakote	Paraply
Ethyl cellulose	Vinyl resins	Vinyl resins on paper	Polyvinylidene chloride	Rubber Hydrochloride	Latex film used for frozen foods	Wax & film formers coated on paper & foils	Wax & film for between pap
Sheets & rolls	Rolls	Rolls	Seamless tubes, rolls	Continuous rolls & sheets	Unexpanded bags Expanded bags	Continuous rolls & sheets	Continuous ro sheets
Transparent to opaque	Transparent to translucent	Opaque	Transparent	Transparent to opaque	Transparent	Translucent to opaque	Translucent opaque
0.001–.020	0.001 or more	Resin 0.001 or more	0.00125–0.00225	Normal 0.0008–0.00225 Tensilized 0.0002–0.0004	Unexpanded 0.018–0.020 Expanded 0.0015–0.002	0.002–0.030	0.004–0.03
25	40	40	24	48	For 1-lb. to 400-lb. packages	36	55
24,300 or less	2,300 or less	—	7,200 — 13,000	24,000 or less	—	—	—
1.14	1.14	1.40	1.68	1.12–1.15	0.935	—	—
10,000	—	—	7,000–11,000	Yield 2,800–4,000 Ultimate 5,500–7,500	15,000 at 40° F. (expanded film)	—	—
30	—	—	25–35	Yield 10–20 Ultimate 350–500	1,200	—	—
48	—	—	67	—	—	—	—
7	—	—	40	—	—	—	—
4,000	—	—	Over 500,000	10,000–1,000,000 (M. I. T.)	—	—	—
2.6	Negligible	—	None	0.6–1.3 at 75% R. H.	Negligible	—	—
High	High	High	0.20 or less	0.5–1.0	Very low	0.3–1.0	0.2–1.0
Depends on R. H.	—	—	Very low	6–85 cc. of air/100 sq. in./ 100 hr. at 100° F. & 760 mm. 100–1,500 cc. of CO_2/100 sq. in./ 100 hr. at 100° F. & 760 mm.	Permeable to CO_2; negligible to other common gases	Low to high	Low to hi
Weak and fair	Good	Good	Excellent, except H_2SO_4 and HNO_3	Good	Good	—	—
Excellent	Good	Good	Good except NH_4OH	Good	Good	—	—
Good	Good	Good	Excellent	Good	Excellent below 30° F.	Fair to good	Fair to go
Soluble	Soluble in some	Soluble in some	Good	Soluble in aromatic & chlorinated hydrocarbons	Soluble except in alcohols, ketones and ethers	Soluble in some aromatic & aliphatic hydrocarbons	Soluble in s aromatic & phatichyd carbons
275° F.	Softens at 200° F., melts at 230–295° F.	180° F.	170° F.	160° F.	Heat shrinks expanded bag to size of package	—	—
—75° F.	—	—40° F.	—20° F.	—50° F.	—50° F.	—	—
Excellent	No effect	Good	Excellent	Fair	—	—	—
Very slight	None	—	None	Slight	Negligible	—	—
Excellent	No change	Good	Good	Good if kept in dark	Excellent at 40° F. and below	—	—
Moderate	Slow burning	Slow burning	Self-extinguishing	Slow burning	Slow burning	—	—
Dow Chemical Co.	B. F. Goodrich Co. Carbide & Carbon Chemicals Corp. Goodyear Tire & Rubber Co.		Dow Chemical Co.	Goodyear Tire & Rubber Co., Inc.	Dewey & Almy Chemical Co.	Menasha Products Co.	

hich excel in some particular property.

not be available for all purposes.

ODUCTS	METAL FOILS				PROPERTIES
Paraply	Aluminum Foil	Tin Foil	Lead Foil	Tin and Lead Composition Foil (4% Tin)	
					GENERAL
ax & film formers between papers	—	—	—	—	Type of Material
ontinuous rolls & sheets	Rolls & sheets	Rolls & sheets	Rolls & sheets	Rolls & sheets	Forms Available
Translucent to opaque	Opaque	Opaque	Opaque	Opaque	Clarity
0.004–0.030	0.0003–0.005	0.0006–0.002	0.0006–0.002	0.0006–0.002	Thickness Range, in.
55	30.5	26½	26½	26½	Maximum Width, in.
—	10,250	3,750	2,400	2,500	Area Factor, sq. in. per lb.
—	2.7	7.3	11.3	11.1	Specific Gravity, approximate
					MECHANICAL
— —	6,500–11,000	—	—	—	Tensile Strength, lbs. per sq. in.
—	2–15	—	—	—	Elongation, per cent
—	16–17	4–7	4–6	6.5–9	Bursting Strength (Mullen) lbs. per sq. in.
—	—	—	—	—	Tearing Strength (Elmendorf), grams
—	—	—	—	—	Folding Endurance
					CHEMICAL
—	0	0	0	0	Water Absorption in 24-hr. Immersion Test, per cent
0.2–1.0	Depends on thickness 0 to high	Depends on thickness 0 to high	Depends on thickness 0 to high	Depends on thickness 0 to high	Moisture Vapor Permeability,[3] grams/24 hrs./100 sq. in. at 100° F. 95% R. H.
Low to high	0	0	0	0	Permeability to Gases
—	Poor to good	Poor to good	Poor to good	Poor to good	Resistance to Acids
—	Poor to good	Poor to good	Good	Poor to good	Resistance to Alkalies
Fair to good	Good	Good	Good	Good	Resistance to Greases and Oils
Soluble in some aromatic & aliphatichydrocarbons	Good	Good	Good	Good	Resistance to Organic Solvents
					PERMANENCE
—	700° F.	300° F.	500° F.	450° F.	Resistance to Heat (Limiting Temp.), ° F.
—	—120° F.	—	—	—	Resistance to Cold (Limiting Temp.), ° F.
—	Unaffected	Unaffected	Unaffected	Unaffected	Resistance to Sunlight
—	None	None	None	None	Dimensional Change at High R. H., per cent
—	Unaffected	Unaffected	Unaffected	Unaffected	Resistance to Storage
—	Not combustible under ordinary conditions	Not combustible	Not combustible	Not combustible	Flammability
ducts Co.	Aluminum Co. of America Johnson Tin Foil & Metal Co.	Reynolds Metals Co. Johnson Tin Foil & Metal Co.			Manufacturers

XUM

PROPERTIES	
GENERAL	
Type of Material	Laminated kraf cellophane—la
Forms Available	Rolls an
Clarity	Opa
Thickness Range, in.	0.0
Maximum Width, in.	2
Area Factor, sq. in. per lb.	2,300-
Specific Gravity, approximate	–
MECHANICAL	
Tensile Strength, lbs. per sq. in.	–
Elongation, per cent	–
Bursting Strength (Mullen) lbs. per sq. in.	6
Tearing Strength (Elmendorf), grams	110-
Folding Endurance	–
CHEMICAL	
Water Absorption in 24-hr. Immersion Test, per cent	Hi
Moisture VaporPermeability,[3] grams/24 hrs./100 sq. in. at 100 deg. F. 95% R. H.	0.1
Permeability to Gases	(
Resistance to Acids	Po
Resistance to Alkalies	Po
Resistance to Greases and Oils	Go
Resistance to Organic Solvents	Attacked by ar solv
PERMANENCE	
Resistance to Heat (Limiting Temp.), ° F.	180
Resistance to Cold (Limiting Temp.), ° F.	—25
Resistance to Sunlight	Exce
Dimensional Change at High R. H., per cent	Sli
Resistance to Storage	Exce
Flammability	Slow b
Manufacturers	

[1] Figures represent pull required to continue te
[2] Using $CaCl_2$ in Test Dish; method is describe
[3] Depends on amount of moisture present, solu
[4] Vinyl chloride or chloride-acetate polymers, c
[5] Waxy laminant.
[6] Asphaltic laminant.

XUM

METAL FOIL LAMINATIONS

				Vegetable Parchment	Wet-Strength Pape	Plain Glassine
inated kraft—metal foil—lophane—lacquer coating	Butvar coating—lead foil—asphalt, kraft—resin—cloth	Butvar coating—lead foil—asphalt—kraft	Heat-seal lacquer coating—aluminum foil—cellulose acetate	Chemically treated paper	Paper with added resins	Physically treated
Rolls and sheets	Rolls	Rolls	Rolls	Sheets & rolls, many weights & grades	Sheets & rolls	Sheets, continuous & converted prod
Opaque	Opaque	Opaque	Opaque	Translucent to opaque	Opaque	Near transparen translucency & op
0.007	—	—	—	0.0017–0.0055	0.0025–0.0070	0.00075–0.003
24	40	—	—	90	88	70
2,300–2,600	1,325	1,655	6,000	6,200–21,600	14,400 and up	7,200–34,000
—	—	—	—	—	—	—
—	70	60	40	High wet strength	High wet strength	—
—	—	—	—	—	—	—
60	75	60	79	13–65	(Dry) 80% of basis weight (Wet) 30–60% of dry test	10–50
110–130	—	166	26	14–76	35–50 and up	6–40
—	—	—	—	High	—	—
High	Low	Low	Negligible	High, but insoluble	High, but insoluble	Medium
0.1 to 0	0.01–0	0.01–0	0.01–0	High	High	High
0	0	0	0	Permeable	Permeable	Low
Poor	Poor	Poor	Fair	Dilute: good	Fair	Moderate
Poor	Poor	Poor	Poor	Dilute: good	Poor	Poor
Good	Excellent	Excellent	Excellent	Fair to excellent; insoluble	Poor	Good
tacked by aromatic & active solvents	Poor	Poor	Poor	—	Absorbs	Good
180° F.	300° F.	300° F.	—	200° F. dry; any temp. wet	200° F. dry; any temp. wet	150–240° F.
—25° F.	—10° F.	—10° F.	—20° F.	—	Good	—20° F.
Excellent	Good	Good	Good	Good	Good	Good
Slight	Slight	Slight	None	Expands, stretches	Considerably less than ordinary paper	Slight
Excellent	Good	Good	Good	Good	Good	Good
Slow burning	Slow burning	Slow burning	Slow burning	Similar to paper	Similar to paper	Similar to paper
	Reynolds Metals Co. Shellmar Products Co.		Dobeckmun Co. Milprint Inc. Shellmar Products Co.	Kalamazoo Vegetable Parchment Co. Paterson Parchment Co.	Can be made by any paper mill	Brownville Paper Co. Deerfield Glassine Co. Glassine Paper Co. Hamersley Mfg. Co. Hartford City Paper C Mountain Mill Corp. Nicolet Paper Corp. Oregon Pulp & Paper C Rhinelander Paper Co Riegel Paper Corp. Thilmany Pulp & Pa Co. Westfield River Paper C

o continue tear after starting. Force required to start tear is too high to measure on same equipment and therefore is not normally determined.
d is described in ANC67 Army-Navy Specification.
present, solubility of gas in water, moisture vaporproofness of film, and vapor presaure differential.
e polymers, either formed or applied from solvent solutions or by calendering hot fuid resin.

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	Vegetable Parchment	Wet-Strength Paper	Plain Glassine	Lacquered Glassine	Waxed Glassine	Laminat
er coating— —cellulose te	Chemically treated paper	Paper with added resins	Physically treated paper	Coated physically treated paper	Coated physically treated paper	2-Ply phys p
s	Sheets & rolls, many weights & grades	Sheets & rolls	Sheets, continuous rolls & converted products	Sheets, continuous rolls & converted products	Sheets, continuous rolls & converted products	Sheets & r
ue	Translucent to opaque	Opaque	Near transparency to translucency & opaque	Transparent and opaque	Nearly transparent and opaque	Translucen
	0.0017–0.0055	0.0025–0.0070	0.00075–0.003	0.0008–0.002	0.0008–0.003	0.002
	90	88	70	52	70	
	6,200–21,600	14,400 and up	7,200–34,000	9,600–20,600	6,600–28,800	9,500
	—	—	—	—	—	
	High wet strength	High wet strength	—	—	—	
	—	—	—	—	—	
	13–65	(Dry) 80% of basis weight (Wet) 30–60% of dry test	10–50	10–25	8–40	26
	14–76	35–50 and up	6–40	6–20	5–38	20
	High	—	—	—	—	
ble	High, but insoluble	High, but insoluble	Medium	Moderate	Very low	Mo
	High	High	High	0.2–1.0	0.2–1.0	0.
	Permeable	Permeable	Low	Low	Low	
	Dilute: good	Fair	Moderate	Moderate	Moderate	Mo
	Dilute: good	Poor	Poor	Good	Good	
nt	Fair to excellent; insoluble	Poor	Good	Good	Excellent	Ex
	—	Absorbs	Good	Poor	Good	
	200° F. dry; any temp. wet	200° F. dry; any temp. wet	150–240° F.	150–300° F.	Heat sealing	130-
F.	—	Good	—20° F.	—20° F.	—20° F.	Depends
	Good	Good	Good	Good	Good	
	Expands, stretches	Considerably less than ordinary paper	Slight	Slight	Slight	S
	Good	Good	Good	Good	Good	
ning	Similar to paper	Similar to paper	Similar to paper	Inflammable	Inflammable	Infla
o.	Kalamazoo Vegetable Parchment Co. Paterson Parchment Co.	Can be made by any paper mill	Brownville Paper Co. Deerfield Glassine Co. Glassine Paper Co. Hamersley Mfg. Co. Hartford City Paper Co. Mountain Mill Corp. Nicolet Paper Corp. Oregon Pulp & Paper Co. Rhinelander Paper Co. Riegel Paper Corp. Thilmany Pulp & Paper Co. Westfield River Paper Co.	Hartford City Paper Co. Hazen Paper Co. Rhinelander Paper Co. Riegel Paper Corp. Westfield River Paper Co.	Deerfield Glassine Co. Glassine Paper Co. Hamersley Mfg. Co. Rhinelander Paper Co. Riegel Paper Corp. Thilmany Pulp & Paper Co. Westfield River Paper Co. Oregon Pulp & Paper Co.	Deerfield Glassine P Hamersley Hazen Pap Rhineland Riegel Pap Westfield Thilmany
ucts Co.						

therefore is not normally determined.

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Laminated Glassine[3]	Laminated Glassine[4]	Plain Greaseproof	Kraft Paper	Laminated Kraft[4]	PROPERTIES
					GENERAL
2-Ply physically treated paper	3-Ply physically treated paper	Mechanical parchment	—	Laminated kraft paper for liners	Type of Material
Sheets & continuous rolls	Sheets, rolls	Sheets, continuous rolls & converted products	Rolls & sheets	Rolls & sheets	Forms Available
Translucent and opaque	Translucent to opaque	Translucent and opaque	Opaque	Opaque	Clarity
0.002 and up	0.003 or more	0.001–0.004	0.002–0.009	—	Thickness Range, in.
52	52	160	80	40	Maximum Width, in.
9,500 and less	6,200 or less	7,200–25,400	4,600–16,600	4,150–5,200	Area Factor, sq. in. per lb.
—	—	—	0.65	—	Specific Gravity, approximate
					MECHANICAL
—	—	—	35% of basic wt.	—	Tensile Strength, lbs. per sq. in.
—	—	—	2–5	—	Elongation, per cent
26 and up	40 or more	10–60	80% of basic wt.	50–60	Bursting Strength (Mullen) lbs. per sq. in.
20 and up	30 or more	8–45	2 pts. per lb. of basic wt.	—	Tearing Strength (Elmendorf), grams
—	—	—	10 double (Schopper)	—	Folding Endurance
					CHEMICAL
Medium	Medium	High	High	High	Water Absorption in 24-hr. Immersion Test, per cent
0.2–1.0	0.1–0.2	High	High	1 to 5	Moisture Vapor Permeability,[1] grams/24 hrs./100 sq. in. at 100° F. 95% R. H.
Low	Very low	Moderate	Permeable	Permeable	Permeability to Gases
Moderate	Moderate	Good	Poor	Poor	Resistance to Acids
Poor	Poor	Poor	Poor	Poor	Resistance to Alkalies
Excellent	Excellent	Good	Poor	Poor	Resistance to Greases and Oils
Good	Good	Good	Not resistant	Poor	Resistance to Organic Solvents
					PERMANENCE
130–150° F.	130–150° F.	150–240° F.	200° F.	150° F.	Resistance to Heat (Limiting Temp.), ° F.
Depends on plasticizer	Depends on plasticizer	—20° F.	—	Good	Resistance to Cold (Limiting Temp.), ° F.
Good	Good	Good	Colors will fade	Excellent	Resistance to Sunlight
Slight	Slight	Slight	M. D. approx. 0.5% C. D. approx. 1.5%	Considerable	Dimensional Change at High R. H., per cent
Good	Good	Good	Avoid dampness, high heat, & low humidity	Good	Resistance to Storage
Inflammable	Inflammable	Similar to paper	Burns readily	Burns readily	Flammability
Deerfield Glassine Co. Glassine Paper Co. Hamersley Mfg. Co. Hazen Paper Co. Rhinelander Paper Co. Riegel Paper Corp. Westfield River Paper Co. Thilmany Pulp & Paper Co.	Riegel Paper Corp. Rhineland Paper Co. Westfield River Paper Co. Glassine Paper Co.	Deerfield Glassine Co. Glassine Paper Co. Hamersley Mfg. Co. Hartford City Paper Co. Kalamazoo Vegetable Parchment Co. Nicolet Paper Corp. Oregon Pulp & Paper Co. Rhinelander Paper Co. Riegel Paper Corp. Thilmany Pulp & Paper Co.	Union Bag & Paper Corp. Thilmany Pulp & Paper Co.		Manufacturers

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XUM



and paper combinations to produce stable, moistureproof wrappers and liners for export shipments.

Ethyl cellulose

This film was just beginning to be used before war restrictions and curtailments removed it from the civilian market. Ethyl cellulose is extremely stable to alkalies, heat and light, and is extremely clear and inherently flexible. Its moistureproofness is about the same order as the cellulose-acetate film. Ethyl-cellulose sheetings can be made moistureproof by the addition of suitable lacquers as surface coatings. Although the base material is stable when melted, the film is extremely difficult to heat seal except under special conditions.

Rubber-hydrochloride film

In several important ways, rubber-hydrochloride film differs materially from the films previously described. First, its base is rubber and not cellulose; second, it is inherently moistureproof and capable of strong heat seals without added coatings. Processes of manufacturing consist of adding hydrogen chloride gas to a special grade of crude rubber. The resulting resin is dissolved in solvents and placed on a moving web which is passed through a heating chamber to evaporate the solvents and leave a transparent film. Rubber-hydrochloride sheets are extremely tough and can be stretched to a higher degree than any of the cellulose-base films. In heavier gauges, the film is slightly cloudy. The stability of rubber films is poorer than cellulose films especially when exposed to heat and to direct sunlight. Since this film has the property of making strong welded seals, it offers possibilities for the packaging of certain liquids which could not be handled by any other film. Because of the rubber shortage, no civilian use of this material is allowed. However, some of it is manufactured and laminated for the packaging of aircraft engines by Method II (use of desiccant).

Vinylidene-chloride films

Vinylidene-chloride films are manufactured by a very unusual process because the resin is nearly insoluble in common solvents and also because it does not lend itself to the usual calendering operations. This film is made by nearly simultaneously heating the resin as it is forced at great pressure (because of its viscosity) through a circular slit orifice. The extruded result is a thin-walled tube which must be cooled, oriented and slit to make a clear flat film. This film has, inherently, the best resistance to water-vapor transmission of any transparent film; it can be strongly heat sealed by special methods and equipment, and it is strong and durable even at sub-zero temperature. It is in limited production and is being used for special applications of Method II, packaging of metal parts and optical equipment using silica gel.

Vinyl films

The vinyl films presently available are usually mixed polymers of either vinyl chloride or acetate, or copolymers of both. Vinyl films are being made by two widely different methods. One process uses the familiar method of casting a film from solvent solutions of the resin followed by a careful removal of the solvent. The newer method is by squeezing out a hot plastic film of the resin between two rolls and then allowing it to cool. This method is called "calendering," since the equipment is similar in appearance to conventional calender stacks. The method of solvent casting has certain advantages. It can make very thin films, it can make films of a wider range of base resins, and its films are completely transparent with shiny surfaces.

The calendering process is limited by the thinness of the films it produces, the type of resin and the fact that the films are translucent to opaque depending upon their thickness. However, this process has the advantage of lower cost and less complex equipment. Both types of films are finding increasing war uses as durable, waterproof and easily heat-sealed barriers and covers. So far no vinyl film of either type has been produced having a useful level of water-vaporproofness.

Paper products

Paper is almost always used to provide strength and durability, or as a base for printing or surface coatings. The only two papers which in themselves have other functions are glassine and parchment which are inherently greaseproof and, to some degree, flavor-tight. Actually, parchment gains these properties after leaving the paper machine. Glassine, therefore, is the only one which, per se, performs a chemical function.*

Paper is a low-cost medium for obtaining mechanical properties, and it can provide an attractive surface for printing and decoration. With the exception of glassine, all chemical properties must come from additional treatments, materials or combinations with other films.

The mechanical properties of papers vary widely depending upon the source and treatment of the pulp, the paper-machine operation, the calendering operations and the ream weight of the finished paper. Papers other than glassine are not efficient bases for many kinds of coating operations without such additional surface treatments as sizing, pre-coating, calendering or the addition of pigmented mixtures (coated papers). To produce surface or intact films, paper coatings or laminating agents must possess thixotropic (anti-penetrating) properties unless saturation of the paper base and use of relatively large amounts of agent are not deterring factors. (Dry wax or asphalt-saturated papers.)

Unfortunately, the saturation of the paper base causes the paper to develop some of the physical properties of the agent used. This results in loss of flexibility and perhaps of some strength factors.

Paper to paper combinations or paper coatings do not, in most cases, have extraordinary chemical functions. Glassine or parchment, however, can be combined (laminated) or coated with relatively small amounts of

* See "Testing Packages and Materials," p. 45, for differentiation of kinds of functions.

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agents to give structure of excellent chemical properties. Glassine and parchment are efficient in this respect because most agents behave similarly to oils, and these papers are not penetrated by, and do not absorb oil materials. This property of glassine and parchment can be used with proper techniques and equipment to combine them to papers and obtain structures approaching the function and efficiency of all-glassine and parchment sheets. Similar results can be obtained with a regenerated-cellulose or plastic base sheeting, although differences in dimensional stability with humidity changes make such combinations liable to distortion and separation.

The paper industry is using increasing quantities of various synthetic resins to impart higher levels of wet strength, and unquestionably newer resins will be found to improve other mechanical properties and to prepare paper for easier coating, etc. Since there appears to be little likelihood of immediate or radical changes in pulping or paper-making processes or equipment, the development of such synthetic-resin treatment appears to be the most important advancement ahead.

Metal foils

Limitation orders have seriously curtailed the uses and production of these materials even for war applications. Tin foil has entirely disappeared, and aluminum foil, previously the most important, has been curtailed for all but the most necessary war uses. Lead foils, however, have been produced in increasing quantities because lead as a metal has been nearly unrestricted in supply. Because of the toxic nature of lead and its salts, the use of lead foils for food packaging requires coatings or added plies to remove it from direct contact with the product. This fact has limited the applications of lead foils to the packaging of dry food products, and certain lead-foil combinations are being used to package much of the tremendous production of dehydrated foods. Lead foil has also been useful in providing a packaging barrier of nearly zero water-vapor transmission for the Method II (using silica gel) packing of war material.

There appears to be hope that aluminum with its advantages of weight, appearance and lack of toxicity, may be more easily obtained for some purposes soon.

The metal foils are a perfect example of the usefulness of combination of materials in providing durability and improved function, and in bringing out the maximum effectiveness of a prime packaging material. Metal foils in normal gauges (.0003 to .001 inches) cannot be printed, handled or formed into packages without seriously degrading the chemical functions of the originally produced foil. For example, .007-gauge aluminum foil has a very low water-vapor permeability rate when tested flat and very carefully handled in the laboratory. Yet if this metal foil alone were wrapped around a carton, the result would be a barrier with pinholes in the corners and folds, and an increased water-vapor transmission rate.

The first task is to add strength to the foils. This is best done by combining it with transparent sheetings or papers through use of a plastic agent or adhesive. The resulting combination can now be printed and subjected to some package forming with a lesser degradation of functional qualities. However, for package forming or uses in which the material would be severely flexed or scuffed, it is necessary to add a film to the other side of the metal so that the metal is now between two tough and durable layers. This results in full protection of the metal and guarantees retention of the original functions. The more folding the metallic barrier must undergo, the thicker the protecting surface layers must be, assuming always that such layers must be as flexible as the metal and remain adhered to it.

The theory is that such thick surface layers increase the radius of the arc over which the metal bends when it is creased and folded. The thinner the surface, the shorter the radius and the more distortion of the metal. The best example of this is the material listed in "War packaging material" as "770" or "A-50" as composed of a 44/36-mesh scrim on the outside combined with a waterproof lacquer adhesive to a 30-lb. natural kraft sheet. This is in turn laminated with a plastic asphaltic adhesive to .001-in. lead foil, the other side of which is coated with a 30-lb. (per ream of 3000 sq. ft.) coating of polyvinyl butyral.

This composite sheet possesses great mechanical strength, is waterproof, substantially impermeable to water vapor, completely greaseproof, pliable, and can be heat sealed to give very strong and impermeable seams and closure. Each part of this structure contributes its own particular functional property to achieve this remarkable result, and each part adds to or protects the functional properties of the other members. The scrim cloth and kraft contribute the mechanical strength. The lacquer adhesive gives some water-repelling action which is made complete by the asphaltic barrier. The lead foil gives its high resistance to the penetration of water vapor and this is aided and protected by the asphaltic coating on one side and the vinyl butyral coating on the other. The vinyl butyral contributes greaseproofness, protection against abrasion and distortion of the lead foil, and provides a strong heat-sealable surface.

The resulting structure is being used in large quantities for Method II packaging of metal parts and assemblies, radio and electrical equipment, and many other types of delicate and corrodable war material which cannot be coated with greasy corrosion-preventative compounds.

This structure should point the way for many more metal-foil combinations which can broaden its uses by performing new tasks. Many prewar applications of metal foils emphasized its decorative character and failed to realize the maximum use of its other functional properties. Metal foils can be made into the most decorative and functional of barriers available for packaging. The costs will be lowered by cheaper aluminum and by coatings and laminations which will hold or improve the properties of thin metal films.

Special papers for packaging purposes

by Arno W. Nickerson

The impact of the second World War has emphasized the necessity for protective packaging of foodstuffs and metal parts, as well as thousands of other items, to be shipped to all corners of the world, wherever the fighting forces may be and under conditions of handling undreamed of in domestic commerce. Such packaging must be resistant to temperatures as low as −20° F. and as high as 130° above, with relative humidities within the full range. Shipping containers may be even dumped overboard from a ship and floated ashore in a net, where the goods may be piled on the beach without protection from the moist sand below or from rain or snow. This requirement, coupled with the lack of tin and other metal containers, has stimulated the paper and board industry to achieve an unheard-of rate of protective development. All this must be done by using non-critical materials; further, the design of package must be such as to make possible shipment from the box-makers' plant to the packing plant with a minimum of freight space. When received, these cartons must be adapted to standard automatic filling and sealing without highly specialized equipment.

How difficult this development task has been can be illustrated by enumerating some of the characteristics demanded by users of special papers, notably the armed forces. Among the utilitarian properties are:

1. Dry Strength
2. Wet Strength
3. Rigidity
4. Pliability
5. Softness
6. Cleanliness
7. Smoothness
8. Moisture-vaporproofness
9. Alkali-proofness
10. Greaseproofness
11. Fireproofness
12. Tarnish Resistance
13. Counterfeit-proofness
14. Water Resistance
15. Heat Resistance
16. Heat Conductance
17. Rodent-proofness
18. Insect-proofness
19. Gasproofness

The industry cannot claim that it has achieved a package that will meet all of the above requirements, but the end use to which the package is to be put has been carefully studied and the properties each package must possess have been carefully defined.

Exterior decoration of packages for the armed forces is not a pronounced factor, as this consists largely of identification markings in one color to which is often added descriptive methods for use of the goods which are packed; this description may be printed in several languages.

The major groups or classifications in which these protective papers are classified may be defined as follows:

Regenerated cellulose for moisture-proofness
Carbohydrates
Vinyl resin—impregnated or coated products
Melamine resins
Rubber base products
Parchment—treated or untreated
Glassine—treated or untreated
Lacquer treatments
Heat-sealing treatments
Asphalt combined papers
Tin and lead foil combined papers
Protein derived from corn and other starches as a coating or as a portion of the furnish in paper making
Micro crystalline wax used as an adhesive and as a dipping compound

Specifications—The following represents a specification of impervious papers used for packaging purposes:

1. Moisture-vapor penetration (M.V.P.)—.05 gram per 100 sq. in. per 24 hours (creased) by the Institute of Paper Chemistry method or by the Southwick method.
2. Odorless
3. Non-toxic
4. Flexible at 20° F.
5. No loss of characteristics at 130° F.
6. Burst of 30 pounds or better
7. Capable of being heat sealed by a moistureproof strength seal
8. Capable of being handled by present packaging machinery
9. Water-resistant
10. Insect-proof

Materials to be packed—The most pronounced demand has been in the field of packaging small metal parts which are subject to corrosion in shipment from point of manufacture to point of assembly. When finally assembled, machines made from corrosive metal are overall packed in highly protective papers or films before being placed in a suitable outer container. Hygroscopic agents are also used to reduce moisture.

Dehydrated food—The latest estimates indicate that more than 1,200 dehydrators in the United States have packed a grand total of 600,000,000 pounds of dehydrated soups, fruits, vegetables and meats in 1943. Many of these products will be compressed after dehydration into cubes or bricks to achieve still further space saving in shipment. Powdered eggs and dried milk have long been packaged for lend-lease shipment to our allies and to the armed forces.

Laminating methods—A wide range of types of combining machines is already in use. By combining a highly resistant treated paper to a sheet of less protective paper and also to a more rigid sheet, such as boxboard or test liner board, the range of protective packages becomes almost unlimited. One of the modern units which has been developed for this purpose is a machine in which

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five plies of different types may be joined with any type of adhesive desired. This unit is designed to operate at speeds up to 700 ft. per minute and deliver the combined construction in sheets.

Tarnish and rust-resistant papers

For wrapping metals sensitive to sulphur the most common papers used are a rag, sulphite or well-washed sulphate sheet of tissue weight (8 pounds – 20 by 30/480). This sheet must be free from acids and chemical impurities and is used for wrapping silverware, aluminum goods, leaded glass, tooth paste tubes and other tarnishable articles. The United States Bureau of Standards specifies that anti-tarnish tissue for wrapping silverware must contain not more than .008 per cent sulphur.

The common method of testing is to wrap the polished silver article in the paper to be tested and heat in an oven for one hour at 100° C. Inspection of the metal article promptly indicates whether there is a tendency for the paper to contribute to tarnishing.

Inhibitors used in the manufacture of paper and paperboard for wrapping or packaging purposes include copper salts, and often lead acetate has been used as a part of the furnish to reduce the free sulphur.

Cotton linings—Cotton-lined paper in the form of bags or sheets is often used where anti-tarnish qualities are desirable. The soft lining serves as additional protection to absorb shipping shocks. Flannels of anti-tarnish type are often used to wrap silverware or to line boxes in which silverware is packed.

Cellophane bags—Cellophane is often used in the form of a bag or a sheet to protect polished metal articles, such as silver, copper or brass.

Rust prevention

Closely related to tarnish prevention is the problem of rust prevention, a problem affecting exporters and those who ship by water in particular, but affecting all manufacturers of metal packaged products to a degree.

A number of waterproofed papers are available, consisting essentially of two sheets of kraft paper of various weights with a layer of waterproof asphalting between. One or both sheets of paper may be creped to provide for stretching in one or both directions. Waterproofed papers can also be obtained with a reinforcement of cotton or jute cords imbedded in the asphalt between the two sheets of paper.

These papers are extensively used for wrapping textiles, tires and metal products. Waterproof papers may also be obtained in combination with burlap, cotton cloth, jute fibre or thin sheets of metal foil. Coils of steel and rolls of cloth are frequently wrapped spirally with strips of this burlap paper.

Where such waterproof wrappings cannot be used for physical reasons or for reasons of expense, some manufacturers have found it practicable to insert into the shipping container bagged quantities of silicate jell (silica gel)—a chemical having the ability to absorb large quantities of moisture. This serves to hold down the relative humidity within the container over an extended period of time, maintaining it below the critical point of 30 per cent and eliminating the formation of rust.

Special coatings

Air-brush coatings—A process in which a liquid mixture of coating pigment and adhesive is atomized by an air-pressure spray and then sprayed onto the moving paper web.

Air-knife coatings—A process differing from that described above in that a thin flat jet of air is used to remove the excess coating from a freshly coated sheet. The coating is applied in excess quantities and in a semi-fluid state by means of a roll applicator which coats the paper. It is removed immediately by the air knife which also helps to give a smooth surface to the remaining freshly applied coating.

Casein coatings—Widely used in the sizing of papers. This material is a protein obtained from milk.

Diaphanic papers—A highly transparent paper made of a chemical wood pulp. It is printed by a lithographic process and then impregnated with a lacquer containing turpentine. The dried sheet is treated with an adhesive by means of which it can be applied to a glass surface. Occasionally used for label purposes on glass containers.

Dope—Trade term signifying a solution of cellulose acetate or cellulose nitrate or ethylcellulose or benzyl cellulose in a volatile solvent such as acetone for use as a coating material.

Dry coatings—Another term frequently used for hot melt coatings.

Duplex asphalt paper—A waterproof paper formed by laminating two sheets with a film of asphalt. Generally used for fibre containers and for moisture-proof bags.

Glycerin—Used as an impregnating agent in some instances where products to be wrapped must be protected from air carrying moisture.

Heat-sealing papers—Many varnished and lacquered papers have heat-sealing qualities which facilitate their use on modern packaging machinery. Among these are varnished and lacquered papers in which the coating has incorporated in it quantities of resins or other thermo-adhesive materials. Hot melt coatings are, by their very nature, heat-sealing since they will soften again under heat. Films formed of rubber-paraffin wax compositions or papers coated with such compositions are likewise heat-sealing.

Hot melt coatings—Thermoplastic coatings used as alternative to lacquers or spirit varnishes. These are melted before application, then picked up by a heated roller and transferred to the web. A high gloss varnish is achieved. More important, perhaps, a high moisture resistance and resistance to fats, oils, greases, soaps, abrasion and scuffing are attained.

Impregnation—The process of treating paper or paperboard with a liquid used in hot asphalt treatments, in waxing and in a number of other cases.

Lacquered glassines—Glassine papers are highly grease resistant and hence are utilized for a vast number

of packaging purposes, particularly for the preservation of goods, tobacco and chemicals. The application of lacquers to glassine papers makes them practically impervious to air and vapors and thus serves to extend their ultimate utility.

Lacquers—A broad group of materials used for coating papers to achieve decorative effects and glossy appearance and to enhance the color values of inks. They are also used to achieve protective effects such as scuff-proofness, moisture-vapor resistance, etc. Lacquers may be applied to papers before or after many such processes as printing. Lacquers consist of solutions of natural or synthetic resins such as cellulose nitrate, cellulose acetate, methyl cellulose or benzyl cellulose in an organic solvent. To this may be added modifying agents such as plasticizers, resins, waxes, or pigments. The solvent evaporates, leaving the dissolved material as a shiny, continuous protective film on the surface of the treated paper.

Pyroxylin coated papers—Papers which have been coated with pyroxylin lacquers. Widely used for box coverings, labels, food wrappers, tobacco wraps, etc. Also fabricated in board stock weights for use in cartons and in displays. Pyroxylin coated papers are made in gold, silver, copper and in a wide range of tinted metallic finishes. Coating is water-repellent and has a high deep gloss finish.

Rubber-derivative-coatings—These are made for high grade, low protein content rubbers. This rubber is put into solution in a solvent, forming a heavy viscous non-drying cement. The rubber cement is placed in a jacketed reactor and is heated for a period of time with a catalyst. By controlling the heat and time, the physical characteristics of the product can be accurately controlled.

The result of this particular reaction is a family of resins of differing viscosities. These resins are recovered from the solvent as a finely divided powder which is vacuum dried. The powder is then dissolved into a solvent and this is deposited as a film on the paper to be treated. The film is glossy, non-tacky, heat-sealing and clearly transparent.

A wide range of materials is made by this method to achieve varying degrees of moisture-vaporproofness or other desired qualities. Coatings have a good anchorage to the paper. They can be heat-sealed at temperatures from 275 to 350 degrees, and can be prepared to give a wide range of gloss finishes. Thus when applied over labels, they are made with a very high gloss. When coating parchment paper, kraft paper and similar materials, the degree of gloss is not as important as other qualities more desirable. Coatings have a low permeability to gas and particularly to air and are highly moisture-vapor resistant.

Mixed with waxes, these rubber derivative materials are used as hot melt coatings. The addition of rubber derivatives to paraffin wax substantially increases the toughness of the wax. It improves its gloss and materially strengthens the heat seal obtained when films of these mixtures are compared with films which consist of the wax alone.

Spirit varnishes—These are alcohol solutions usually of manila gum which dry by the evaporation of the solvent. They give a clean smooth finish over most grades of paper and are usually run over print. Care must be exercised not to use inks soluble in alcohol on sheets which are to be spirit varnished. (See also varnishes, below.)

Varnishes—Varnishes are solutions of resins (copal, shellac, etc.) in a solvent such as turpentine or linseed oil. Usually a drier is also included. After evaporation of the volatile elements in the solution and the oxidation of the non-volatile elements, a thin shiny layer of the dissolved material remains. Varnishes are often utilized as an after-print coating and are then called overprint varnishes.

Vinyl resins—Vinyl resins or copolymer vinyls are formed by the simultaneous copolymerization of vinyl chloride and vinyl acetate. The resultant product is a tough, colorless, transparent resin soluble in a number of solvents.

The various vinyl resins are applied by three principal methods. The first is the solution coating method in which a roll or doctor blade is used to control the application of the film. In such cases, it is necessary to "force dry" or bake the coated stock in order to rid the film of the last trace of the solvents, since copolymer vinyl resins are not heat hardening. For film thicknesses such as are used in connection with the packaging industry, a few minutes of such baking at approximately 250° F. is usually sufficient.

Calender coating of vinyl resins is accomplished by working the plastic mass into a thin film over heated rolls, then calendering this film continuously on to paper which is fed through the machine at the same rate as the film is formed. Vinyl calender coated papers are widely used as liner material in closures for food products. Solution coated papers seem to be better fitted for the wrapping grades, since a thinner coat can be applied by the solution method. Aluminum foils, such as are used for cheese wrappers, are frequently treated with a thin clear coat of copolymer vinyl.

The thermoplastic qualities of copolymer vinyl resins suit them particularly for cases where heat sealing is required. Solution coating is used on labels in order to achieve improved resistance to water, alcohol, alkali or grease.

The third coating method has but recently reached the commercial stage and involves the use of vinyl emulsions. The method is particularly desirable for coating the surface of porous materials with a minimum consumption of resin per unit of surface covered. This is possible because the water strikes into the porous surface first and thus prevents penetration of the lacquer. The method seems to have particular application for use in conjunction with pulp containers.

Wax-rubber coatings—Wax is frequently mixed with rubber derived materials to form moisture-vapor resistant coatings of the hot-melt type.

Wet-strength papers

Wet strength is a property of paper that retains its toughness when the paper is saturated with water. This property is extremely important today in papers used for military shipments and substitutes for other packaging materials, such as shipping containers that will not fall apart or scuff when soaked with water, paper bags used as substitutes for wrapping vegetables and meats.

In the past, several materials and processes have been used to impart such property to paper: glue-formaldehyde, regenerated cellulose (viscose), urea formaldehyde, parchmentization and zinc chloride. All these treatments, however, require special equipment in the paper mill for application.

Recent discoveries have proved that the new melamine-aldehyde resins have unexpected characteristics in giving wet strength to paper without the addition of special equipment. This development is of particular interest to users of packaging supplies when specifying papers where a high degree of wet strength is essential.

Melamine compounds for paper treatment are received at the paper mill in finely divided form. This product needs only to be dissolved in warm water containing hydrochloric acid and then added to the stock. The most satisfactory point of application for the resin solution is after all beating and other refining have been completed, and as close to the paper-machine wire as operating conditions permit. This material has a particular characteristic which some other materials previously used for this purpose do not have. The melamine resin in acid solution is largely retained by the paper fibres so that it is not lost in the water of the paper-making process. Because of this fact, it can be added to the paper pulp before the sheet is formed without requiring modification of either machine or operation in the paper mill. The use of acid-melamine resin formula, it is claimed, does not endanger paper itself or paper-mill equipment. The explanation is that the acid does not go with the paper but remains with the white water. Tests have shown that addition of these materials does not have a corrosive effect on the paper plant equipment.



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The following test results show how melamine treatment of paper pulp imparts extraordinary wet strength to the sheet to which it has been added and at the same time greatly increases folding resistance of the dry sheet.

Cellulose fibres treated with not in excess of 3 per cent of the melamine resin colloid retained between 70 to 90 per cent of the added resin. The wet strength, as measured by wet tensile strength after soaking 16 hours, increased from almost nothing to 50 or 60 per cent of the original dry strength. Wet Mullen increased in about the same proportion, while the wet rub resistance (double strokes to wear through the paper) rose from an average of ten to several thousand. This latter property should be of interest in connection with the treatment of containers for such products as kitchen cleaning powders, where the container is often in contact with water.

Dry Mullen and dry tensile values were increased about 15 per cent. The folding endurance, instead of dropping, as is the case when wet strength is obtained by tub treatment, was materially increased.

Aging properties of paper beater-treated with melamine resins were shown by the following results. Under accelerated oven aging conditions of 72 hours at 105 deg. C. (aging test used by U. S. Bureau of Standards), the

1. Development of the frozen-food industry has called for new materials capable of withstanding special hazards attendant upon refrigeration from processing to consumption. Photo shows an institutional size, 2 1/2-lb. duplex bag. It has a liner of wet-strength laminated glassine and a printed, wet-strength white kraft exterior. Photo Benj. C. Betner Co. 2. Wet-strength paper is used widely for the plies of multiwall bags to prevent deterioration from water penetration of the paper. This is particularly useful in the case of products like potatoes which are packed wet. Here bags are tested with 24-hr. water spray.

folding endurance of the beater-treated paper so aged was higher than that of the original untreated paper and was much higher than the tub-treated samples.

Tearing strength is lowered by all wet-strength treatments, but the beater-treated paper shows less lowering of tear values than tub-treated paper does.

As far as is known, any of the usual paper-making sizing materials and fillers may be used with the melamine treatment without deleterious effects. Experiments in which various types of dyes were incorporated with the melamine-treated stock showed changes in shade, strength and fastness properties of some dyes. In certain instances fastness to bleeding in hot or cold water was definitely improved. In other instances, decreased fastness to light was observed, usually proportional to the amount of resin used.

By considerable laboratory research and mill trials, it has been concluded that the beater treatment is effective on any form of cellulose fibre, although results are more noticeable when used with a strong pulp. A wet-strength kraft sheet may have a dry tensile strength of 20 lbs. and a wet tensile of about 10 lbs. Groundwood sheet given similar treatment showed a dry tensile of 2 lbs. and a wet tensile of 1 lb.

The following characteristics of other processes for wet-strength treatment will help the user of such material or paper to make comparisons of relative qualities:

Glue formaldehyde has an unpleasant odor which makes it unsuitable for papers in direct contact with foods. It requires special equipment and cost of ingredients is high.

Regenerated cellulose—This is expensive and requires very special equipment which is not suited to paper mill operation, although resulting product can be made with high wet strength, durability and greaseproof properties. Paper so treated is suitable for direct contact with foods.

Urea formaldehyde can impart excellent wet strength both to resin-sized and waterleaf paper when the paper web is impregnated with the resin solution and the resin subsequently cured on the paper-machine driers. Until recently this was the only satisfactory method of applying urea-formaldehyde resins to paper, therefore limiting the use of these resins to mills having special application equipment. Recently, certain modified urea-formaldehyde resins have shown some promise in beater applications, but the commercial status of these types is still uncertain.

Parchmentization is usually applied to light weight stock, requires special equipment, is expensive, but imparts high wet-strength and greaseproof properties.

Melamine-formaldehyde—Fold resistance is increased over that of untreated paper. Dry tensile and bursting strength are increased moderately, but definitely. The wet-strength properties of the treated papers are much more permanent when stored at high temperature and humidity than wet-strength properties imparted by urea-formaldehyde resins. Water resistance of resin-sized papers is increased slightly by this process. Retention of clay fillers has been improved in some instances. Although tear resistance may, in some cases, be reduced slightly, the amount of drop is less than the loss from tub-sizing processes which have been examined. Application is simple and the cure rapid. The dry resin is stable and therefore may be kept as a stock item.

Melamine is being made in increasing quantities and is available for essential civilian and military uses. In many instances, the additional dry strength obtained from melamine beater-treated papers, it is said, could permit the use of lighter weight papers.

Reference

Charles S. Maxwell, "Use of Melamine Resins for Better Wet Strength," a paper presented at TAPPI Convention, February 16, 1943.

OVEN-AGING TESTS*—105° C.

Type of Resin	Applied at	Wet Tensile,† Hours Aged			Fold-MIT Hours Aged			Tear-Elmendorf-g., Hours Aged		
		0	16	72	0	16	72	0	16	72
UNTREATED KRAFT	..	0.5	1.4	1.9	223	219	152	84	79	75
UREA-FORMALDEHYDE	Tub	10.3	10.8	11.2	189	120	40	45	47	34
MELAMINE-FORMALDEHYDE	Tub	4.6	11.9	11.4	191	89	41	64	48	38
MELAMINE-FORMALDEHYDE + HCl	Beater	8.1	9.3	9.0	1035	834	461	69	72	54

* All tests made on bleached kraft handsheets with approximate basis weight of 50 lbs. (25 in. × 40 in.—500).
† Wet tensile measured in machine direction on strips soaked 16 hours. Results expressed as pounds per inch.

EFFECT OF ADDING RESINS BEFORE OR AFTER REFINING*

Length of Beater Treatment (Full Load), Min.	Length of Modern Refining, Min.	No Resin Added		Resin Added‡ Before Morden			Resin Added‡ After Morden		
		Fold, MIT	Wet Tensile†	Resin, %	Fold, MIT	Wet Tensile†	Resin, %	Fold, MIT	Wet Tensile†
0	0	2	1.0	1.5	24	2.7	1.4	18	2.9
15	0	28	2.0	1.7	264	5.1	1.5	522	7.0
15	2	114	2.4	2.2	1074	7.8	2.0	1148	10.2
15	5	576	2.9	2.4	1177	7.6	2.1	1141	11.7
15	15	1537	2.7	2.4	1517	6.6	2.3	2160	15.8
15	30	1762	2.5	2.3	3181	5.3	2.4	3233	14.4

* All tests made on bleached kraft handsheets with approximate basis weight of 50 lbs. (25 in. × 40 in.—500).
† Wet tensile measured in machine direction on strips soaked 16 hours. Results expressed as pounds per inch.
‡ 3% Resin (on dry fibre basis) added in each instance.



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1. Ninety per cent of the glassine employed in packaging protects foods, though medical items, such as the Band-Aid in cellulose glassine, have used it to advantage. The Sunshine cracker trays and the Hershey's cocoa container use glassine to make a board which is greaseproof lined, while the same material lines the fiber can used by Nestle. Photo Riegel Paper Co.

Glassine—protective & decorative

by F. S. Leinbach*

The new general Conservation Order M-286 on specialty papers applies to plain, wax-coated and laminated glassines as well as other speciality papers. Because this group of papers has always been used very largely for protective rather than for decorative purposes, the new restrictions prohibiting use for non-essential products do not materially alter the situation regarding their availability. Their essential protective qualities are borne out by the fact that over 90 per cent of the various glassines have been used in the food field.

Glassine is the densest, most compact form of paper. It is made of exceedingly small fibres that are "hydrated" —that is, water is driven into their cellular structure until they have become nearly gelatinous. After the paper is formed on the machine, it is supercalendered. Under the terrific pressure and heat on the hydrated cellulose, the paper becomes smooth and quite transparent. It is then glassine. If the supercalendering is omitted, the paper is neither smooth nor transparent, but the other inherent qualities are there. This is termed greaseproof paper.

Because the specially prepared fibers of glassine and greaseproof form without the porosity that usually characterizes paper, and because cellulose itself is grease-resistant, these papers are highly resistant to the passage of oils, fats and greases. The degree of resistance is usually measured by the number of seconds a paper can withstand penetration by turpentine.

The close-knit structure and the hydrated condition of their cellulose enable these papers to resist transmission of flavors and aromas. Thus they maintain inherent flavors and aromas within a package and exclude any that might be contaminating. They also are quite gasproof among papers, particularly against hydrocarbon vapors. Untreated, however, they are neither waterproof nor moistureproof. These qualities, particularly the latter, must be attained by a surface treatment with paraffin wax, or a mixture containing some percentage of that material. The smooth, non-porous, non-absorbent surface of glassine is ideal for wax-coating, lacquering or laminating, and much of the glassine manufactured receives one of these treatments. It is waxed to make it water-vaporproof, more transparent and glossy, and to assure adequate heat-sealing. It is laminated to produce a water-vaporproof sheet, while, at the same time, the lamination produces a paper that is softer and stronger than a single sheet of the same weight. Glassine is lacquered to make it more transparent and glossy, repellent to water-vapor and water, and to assure its making a good heat-seal. The coating also enhances the original greaseproof, gasproof and flavor-retaining properties.

Glassines may be embossed for decorative purposes. The recent discovery of "deadness," or the ability of a soft glassine to hold folds, has brought out many new applications of embossing. All glassines and glassine derivatives can be printed by any of several methods.

In glassine the weight of 500 sheets, 24 by 36 in., is taken as "basis weight." Thus, "25-lb. paper" means that twenty-five pounds of paper will cover the area of this much paper, 432,000 sq. in. In single sheets, a ream of paper weighs from 20 to 40 lbs.; laminated glassines may weigh from 45 to 90 lbs. The weight of 1,000

* The author wishes to express his appreciation for the assistance and the guidance of the Technical Committee of the Glassine and Greaseproof Manufacturers Association in the revision of this article.

sheets in any given size needed for a package is calculated by the following formula:

$$\frac{\text{length} \times \text{width} \times \text{basis weight}}{432}$$

Length and width are in inches, and basis weight is in pounds. The figure obtained here, multiplied by the price of a pound, shows the cost of 1,000 packages.

There are many variations of glassine and its derivatives: for strength and economy the unbleached or lightly bleached ember types are used. There are also the opaque, pigmented whites, and the clear and colored transparencies. Each mill has standard colors which it either stocks or runs from time to time so that smaller lots will be available. Ordinarily the massive proportions of a paper machine require that special colors and grades be made in fairly large minimum quantities—usually five tons.

The properties of these papers read like the language of packaging—impermeable, greaseproof, water-vaporproof, gasproof, flavor-and-aroma-retentive, mechanically operative, transparent, easy to heat-seal, economical, etc. These are qualities so fundamental that each year glassine finds new uses. Recently products that might have suffered from the shortage of materials have found the protection they need in glassine and its derivatives. The sales of these packages vouch for their appearance as well as their protective value.

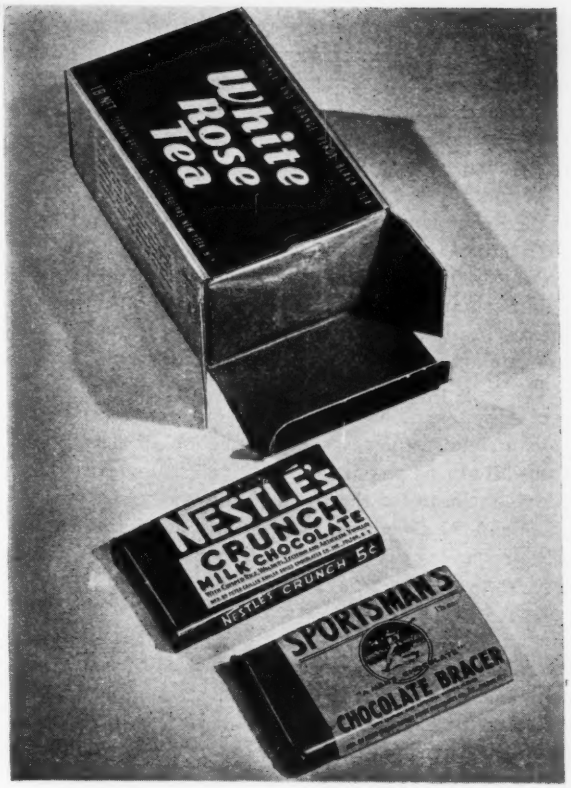
Wet-strength glassine, i.e., glassine which has all the normally inherent qualities of its kind, but which, in addition, retains a great deal of its physical strength even after long submersion in water, is one of the most notable of the recent developments in this field. Wet-strength glassines can be waxed, laminated, lacquered or given combinations of these treatments, just the same as the usual varieties. This, of course, brings an entire series of new products to the package maker.

The importance of papers which combine the qualities of wet-strength and greaseproofness, wet-strength and water-vaporproofness, etc., is obvious to anyone wishing to package meat and dairy products, frozen foods and many other commodities. Laminated wet-strength glassine already plays an important role as a liner for bags used in packaging frozen vegetables.

For food products containing oil, such as the shortening in crackers or biscuits, papers can be used in several ways. In one system a sheet of greaseproof paper—or, for better protection, waxed glassine—is interfolded by machinery as it sets up the carton. For further protection, the carton is wrapped with a waterproof material.

Many such packages are made by equipment that sets up the carton and the liner independently, so that the side folds of the liner are heat-sealed for positive closure;

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2. Glassine forms the inner bag for the White Rose tea carton and is the protective wrap for candy bars. 3. SKF roller bearings, delivered in cartons, are first glassine wrapped. Photos Glassine Paper Co. 4. Laminated glassine protects various hygroscopic products packaged in fibre cans, cartons, envelopes. Photo Riegel Paper Co.

after the package is filled, this type of liner may be closed by either the patented heat-seal closure or the very efficient double-fold closure developed by several machine companies. Unless the product needs unusual protection, a package of this type generally does not carry an outer wrap, for waxed glassines are the most water-vaporproof form of waxed paper. Glassine is advisable in these packages not only because it maintains the original quality of the product, but also because it allows the use of a less carefully made stock and printing inks which might contaminate the product through another type of liner. The liner also prevents the grease of the product from staining the carton and helps minimize rancidity.

The same general type has found wide acceptance in packaging cereals, brown sugar and other products where moisture-vaporproofness and protection of flavor and aroma are of paramount importance. The waxed liner allows reclosure of the package to protect the unused portion of the contents. Greaseproof paper and glassine are often laminated to paper board to produce greaseproof carton stock of good moistureproofness.

If the product is such that contact with wax is not desirable, a liner can be made from laminated glassine. One type of machine places the liner directly from rolls of paper and closes it with glued seams. Another inserts prefabricated bags as the carton liner. These bags can be obtained with an imprint at the top, allowing for a heat-seal closure. Several soup mixtures and dessert powders are packaged in one of these types.

For some products, among them certain precooked cereals and dough mixtures which need not be moisture-vaporproof, a plain, unwaxed glassine liner is used, with a folded closure and glued seams.

Special grades of glassine are made sufficiently alkali-proof for many purposes; waxing their surfaces enhances this quality, and lacquered glassines are excellent in this respect. While no established soap manufacturers allow free alkali in their products, the lubricants used in molding the soap have an alkali effect on the wrapper if traces of them are carried on the soap. Therefore, the soap manufacturer finds in glassine derivatives a wrapper combining protection and long-lasting appearance.

The inherent greaseproofness of these papers and the ability of the mills to make them without harmful acid or alkaline materials (pH range, 6.5 to 7.5) enabled these papers to be among the first found suitable for packaging highly polished machine parts whose sensitive surfaces would otherwise be corroded by more acid or alkaline material. Less grease-resistant materials also would allow escape of the oils and greases that are applied to these parts as corrosion preventives.

The density and high dielectric strength of special grades of glassine have made them extremely useful for electrical insulating purposes, particularly as the interleaving in special types of electrical condensers and in coil winding.

Surgical products, such as bandages and items for first aid, are hermetically sealed in glassine and then sterilized by heating at high temperature. The dense structure of this wrapper keeps the objects sterile longer.

Many types of machines are available for wrapping small items, particularly cakes, in waxed glassine, printed or plain. Spotting by electric eye is common, and the closures are heat-sealed. The same machines handle lacquered glassines well. If printing or spotting is not desired, these machines will affix a label to this type of wrapper with a special glue. Small pies and similar products that must "breathe" are wrapped in unwaxed glassine, often prefabricated into different types of attractively printed bags.

A striking example of the industry's ability to "tailor-make" papers for specific uses is found in the economical printed and lacquered glassines widely used for packaging bread. Specifically developed to combine strength, good

PROPERTIES OF GLASSINE AND GREASEPROOF PAPERS

	Greaseproof papers	*Glassine papers*	*Waxed glassine*	*Laminated glassine*	*Lacquered glassine*
			GENERAL PROTECTIVE FUNCTIONS		
GREASEPROOFNESS	Yes	Yes	Yes	Yes	Yes
FLAVOR RETENTION	Yes	Yes	Yes	Yes	Yes
WET STRENGTH	Available	Available	Available	Available	Available
*RESISTANCE TO GAS TRANSMISSION	Fair	Fair	Good	Good	Good
WATER VAPORPROOFNESS	No	No	Yes	Yes	Yes
			GENERAL PACKAGE FORMING QUALITIES		
PLIABILITY, SOFTNESS	Yes—in plasticized grades	Yes—in plasticized grades	Yes—in plasticized grades	Excellent	Yes—in plasticized grades
GLUE SEAL	Required	Required	Can be used	Required	Can be used
HEAT SEAL	No	No	Yes, but of limited strength	No	Yes, very positive
			GENERAL ADAPTABILITY TO VISUAL FUNCTIONS		
TRANSPARENCY	No	Satisfactory	Good	Fair	Good
SMOOTH SURFACE	No	Yes	Yes	Yes	Yes
HIGH GLOSS SURFACE	No	No	Yes, but will smudge	No	Yes
GLOSS PRINTING AVAILABLE	No, but prints well	Yes	Yes	Yes	Yes
COLORS, TRANSPARENT	No	Yes	Yes	Yes	Yes
COLORS, OPAQUE	Yes	Yes	Yes	Yes	Yes

* See MODERN PACKAGING, July 1943, L. W. Elder, "Permeability of Flexible Materials."



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5. Close-knit and hydrated, glassine papers resist transmission of flavors and aromas, are ideal wraps for potato chips, candy, gum. Photo Riegel Paper Co. 6. Glassine is inner bag for tea bag carton. Photo Deerfield Glassine Co.

mechanical operating qualities, and excellent protection (flavor as well as moisture) with transparency, gloss, and brilliant coloring, these papers offer an opportunity for good individual designs.

Glassine as a wrapper, a liner, a covering for carton stocks, and often as an interleaf between layers, is of prime interest in packaging candy. Its greaseproof and flavor-retaining qualities preserve the package as well as the product.

New and interesting products are found in combinations of glassine. One manufacturer finds excellent long-term protection in packages to be shipped to distant points when he wraps them with a waxed, laminated glassine. This combination offers unusual moisture-proofness, with all of the inherent qualities of waxed glassine. Lacquered laminated glassines rank among the most highly water-vapor-resistant packaging materials. That this type of paper has the ability to meet special requirements is shown in its highly successful use in special packages for frozen foods. Although they are sensitive to handling, several types of equipment can handle them well, and the protection they offer well rewards the care required. Machines are available which will use rolls of heat-sealing lacquered glassines automatically to produce heat-sealed bags.

The general technique of lamination has enabled paper processors to combine glassines and glassine derivatives with foils, plastic films, and other packaging materials. These combinations produce laminations in which the specific qualities of each ply are added to a total of outstanding packaging qualities.

Bags, often attractively printed, are obtainable in any of the greaseproofs, glassines and glassine derivatives. Because of this wealth of available combinations with glassines, the bag maker should always be consulted on packaging problems.

The versatility of protective glassine is shown by manufacturers who use various forms of it to replace metallic foil on candy, chewing gum, or small packages requiring superior protection, and on wrapping machinery that had been designed to take advantage of the folding characteristics of foil.

As the transparency used in "window" envelopes, glassine and lacquered glassine have long given outstanding service. While the visual functions of glassine and its derivatives must necessarily be secondary during war times, the package maker will find ample opportunity in this field for his postwar activities. Colorful printing upon glossy surfaces, with a choice of clear or colored transparency, white or colored opacity for a background, coupled with the protective functions that are needed to carry a product through storage and delivery, all are possibilities of direct advantage to the beautiful and appealing as well as to protective phases of packaging.

These and many other examples show that when working out a new package, wherever a problem of protection arises that may involve oils and greases, flavors and aromas, loss or gain of moisture, or contamination by vapor or bacteria after packaging, where mechanical operability is a factor, or transparency, heat-seal, or attractive printing are an advantage, full consideration should be given to glassine and its derivatives, and to the long experience of their manufacturers in solving of packaging problems.

Waxed paper

It is easy to understand why waxed papers so readily fit into most packaging problems, where moisture protection is necessary, when several factors are considered. First are the properties of wax that are inherent in the product. Wax itself is odorless, tasteless and not affected at ordinary temperatures by either acids or alkalies. It is not a host to either mold or yeast spores. The proper grades withstand a wide range of temperature without loss of protective powers. When a sufficient surface coating of wax is applied to the right kind of paper, it is easily and completely sealed by the application of heat, no glue being necessary. The grades of paper that may be waxed are many: tissues, twisting paper of several grades, regular and opaque sulphites, glassines, greaseproof krafts and manilas. Papers may be made opaque or highly transparent depending on methods and stocks.

Flexibility of wax paper

The equipment of a modern waxed paper company is very flexible in the kinds and weights of waxed papers that may be produced. The same raw stock may be waxed in a variety of ways, either lightly or heavily. A sheet may be waxed on one side only, impregnated with wax with little, if any, surface wax, or waxed lightly or heavily on both sides of the sheet with or without much penetration of the sheet as is desired. Package wraps are made to fold readily around a carton. When printed in several colors, beautiful effects are obtained, and the proper wax coating over the printing gives a fine glossy appearance.

Its adaptability and economy account in large part for the ever-increasing amounts and kinds of waxed paper now in regular use.

The laboratories maintained by waxed paper manufacturers, ink makers, paraffin and resin manufacturers, working separately and often in conjunction with each other, have developed many "tailor made" papers to solve some particular problem. By working, also, with the manufacturers of wrapping and carton lining equipment, it has been easy to develop the right paper and the right wrapping or lining machine for almost any kind of package. Waxed papers are widely used, and some of the more common uses are here noted:

Bread wraps—Waxed bread wrappers are of three general kinds. The one ordinarily used is the opaque wrapper printed in bright colors. The latest development in the use of this type of wrapper is "electric eye" registration. With this device attached to the wrapping machine, a top and two side panels may be registered the same on all loaves. If the eye is not used on automatic wrapping machines, the printing must be of a continuous nature so that it need not be registered on the loaf. Some bakers have also added equipment for applying an identifying end seal on both ends of a loaf to provide additional identification on the ends of loaves.

Transparent waxed wrappers are also widely used, especially on special breads such as rye, whole wheat,

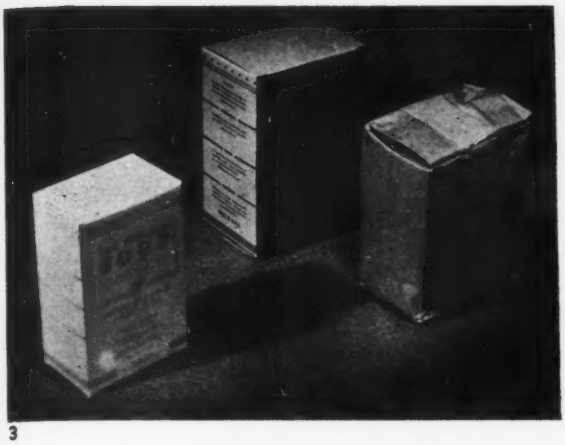
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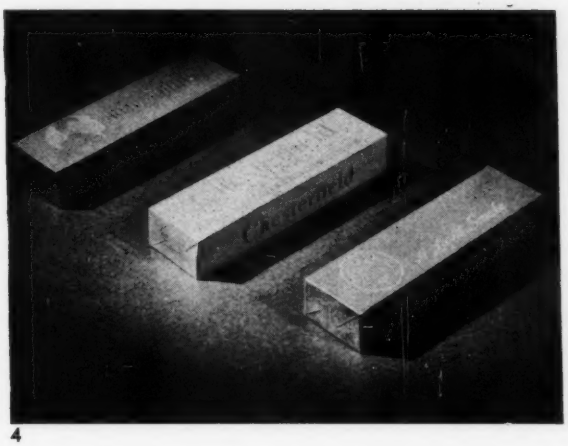
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1. Outer wraps of waxed paper are used for some products, while others require inner liners. 2. Waxed paper, printed in rolls, is roll-fed to provide protective wrap for cereals and many dry products. Sometimes the registering is by an electric eye. Photos Central Waxed Paper Co.



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3. & 4. Soups for allies and cigarettes for soldiers are protected by waxed-paper wraps. Photos Menasha Products Co.

raisin, etc., adding to sales appeal. Transparent sulphite and glassines are both used, and are popular not only as a bread wrapper but also for packaging sweet goods, cakes and rolls.

Blank cartons with printed wraps and liners—The waxed paper industry has come a long way since cartons were first wrapped in waxed paper. They are wrapped to protect the contents against moisture loss or gain. Originally, an ordinary waxed sulphite was used which partially obscured the printing on the carton. A more transparent wrap was developed and then a supercalendered sheet of high gloss and transparency followed. This was, and still is, an excellent wrap for a printed carton, combining reasonable cost with a high degree of transparency and protection, and is readily usable on any self-sealing wrapping machine. Considerable tonnage is used by manufacturers of foodstuffs.

Printed wrappers on glossy opaque stock were the next logical step, followed closely by the wrapper with electric eye registration. Fine process printed wraps of two, three and four colors are now common, and the panels may be registered as to printing with respect to the carton so the appearance is that of a printed carton. This makes a most convenient and economical method of producing a moistureproof package, especially if a large variety of brands are manufactured. Much less money is tied up in inventories with printed waxed paper than is necessary if dozens of different printed cartons had to be held in stock; and at the same time less storage space is needed. Plain cartons may be used with any number of different printed wraps and only a few minutes required to take one printed roll off the machine and replace it with another for a new special brand, provided, of course, the sizes of the cartons are the same.

There have been considerable standardizations of carton sizes in the last few years so that the number of sizes of cartons, compared to the number of brands and designs used, is small. It is not unusual to see a foodstuff manufacturer with only three or four carton sizes producing a hundred or more brands, many under special label, and the balance their own line. In cases like this, it is an advantage to carry plain cartons and printed waxed paper.

Biscuits, gum, soap, salt, butter, candy, yeast and dehydrated eggs are but a few of the products adequately protected by waxed wrappers properly registered by means of the electric eye.

Carton liners—The plain chipboard of the carton is protected from the contents by the use of waxed glassines, krafts or sulphites, placed in sheets or in die cut form by hand, or automatically cut from rolls and inserted by the carton forming machine. When the product to be cartoned has a grease or shortening content, the waxed liner most commonly used is a waxed glassine. The reason for this is that a glassine paper is greaseproof and prevents the absorption by the chipboard of the shortening which would cause unsightly penetration. Some packagers prefer the use of waxed bag liners and these are also manufactured by a few of the waxed paper manufacturers.

Government use—There is no better proof of the ability of a proper wax coating to protect foodstuffs from atmospheric changes than its use by the Quartermaster Corps which specifies heavily waxed wrappers, or wax-dipped cartons for packaging U. S. Field Ration K in breakfast, dinner and supper packages. These packages may be subjected to the worst possible climatic conditions—in the steaming jungles of the South Pacific, the baking heat of North Africa, or the sub-zero cold of Arctic regions. Yet these concentrated food rations reach the men in good condition, thanks to a great extent to the protection of wax. The climatic conditions, the irregularity of storage and transit facilities, to which these rations are subjected, far surpass any to be found in normal use. Dried eggs, protected by a wax wrapper, are shipped in huge quantities under Lend-Lease agreement.

Butter—Some creameries have changed the type of waxed paper used on their automatic butter-wrapping machines. These machines first wrap the butter in parchment which can be stripped off easily without butter clinging to it. Many creameries then add a dry wax wrapper, which gives partial protection against loss of weight through evaporation. Surface-coated waxed sheets, though they contain no more wax than the impregnated or dry sheets, are considerably more resistant



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5. Protection as well as package appeal are afforded frozen foods by waxed paper. 6. Cookies retain their crispness and chewing gum holds its flavor when protected by waxed paper. Photos Nashua Gummed & Coated Paper Co.

to moisture. For this reason, several of the larger creameries which formerly used dry waxed paper now use a sheet with a surface coating thereby considerably increasing the protection offered.

Chewing gum—Much of the stick gum, formerly individually wrapped in laminated foil, is now wrapped in specially made waxed papers, thus releasing large quantities of aluminum and other metals which are needed for direct use in war industries.

These examples adequately demonstrate not only that waxed paper stands on its own feet as a packaging material, but also that through complete coöperation among refiners and manufacturers of both waxed paper and machines, it is readily adaptable to an even greater diversity of practical uses.

Frozen foods—The paper used for wrapping frozen foods is specially waxed. The regular wax coating is fortified by the addition of certain other waxes or other substances to insure a seal and flexibility that will withstand the extremely low quick-freezing temperatures to which these packages are subjected. The wrapping equipment in many of the frozen food plants is equipped with the electric eye. With the restrictions on the use of tin cans for packing foods, the production of frozen foods will no doubt increase at an accelerated rate, and the waxed paper used will increase proportionately.

Meats—At ordinary cold storage temperatures, a straight wax coating does everything asked of it. Several years ago waxed liners began to replace parchment in poultry cases because they offered better protection against oxidation and "freezer burn."

For many years the meat-packing industry has used large amounts of waxed paper. The advent of the cold storage locker service marked the beginning of one of the most rapidly mushrooming businesses in the country. Fresh-killed and cut meats can be kept satisfactorily for many months at below-freezing temperatures, thanks to the development of specially made waxed papers. A satisfactory locker paper must be strong, wet or dry, bloodproof, and able to withstand extremely low temperatures. It must also be moistureproof yet dry on one side so that the butcher may stamp the date and kind of meat on it. All of these qualities are available today in many waxed papers.

Candy—While the candy trade has for years been using various grades of waxed papers, in recent years the manufacturers of candy bars especially have turned more and more to waxed transparent glassines, opaque glassines, and opaque sulphites, some coated with a combination of high-melting-point waxes. This trend has increased in the past year as the use of other types of wrappers has been restricted. In addition to satisfactorily replacing foil with an attractive printed wrapper, the savings in cost of the wrapper help to make up for the increased cost of the other materials and the labor that goes into the manufacturing of the candy bar itself.

For a great many years waxed paper has been used as a wrapper for candy kisses, where a sheet with special twisting qualities is required. Twisting qualities may be imparted to sheets of other materials by the addition of controlled amounts of a plasticizer. Through recent developments in this art, transparent waxed glassines are now used quite generally as twist wrappings for candy.

Special bags—Aside from bags used as carton liners and for bread wrappings, bags are made of waxed or wax-laminated paper for a variety of other products. Potato chips and popcorn are often packaged in this way, while envelopes of laminated glassine or sulphite are used extensively for packing flavoring powders.

Research is continuous: The waxed-paper industry will be equal to the demands put upon it in these trying times, as has all business in this country. Laboratory research will continue at an activated pace, to be ready with better products for new as well as old uses. If war has no other benefit, it stirs all industry to find better, cheaper, easier ways to protect the necessities as well as the luxuries of life. Sometimes we are wont to think of any radical change, for example the use of an entirely new type of package or wrapper, as a "substitution," but the use of this word in that connection is often ill advised, for the "substitution" may turn out in reality to be an "improvement" which will be permanent.

Vegetable parchments

by Glenn Stewart

Vegetable parchment is processed paper which is made from unsized sheets prepared from rag or pure chemical wood pulp. The original raw stock, which the paper maker calls *waterleaf*, is passed through a bath of sulphuric acid. The acid is washed off the paper with pure water and the paper is then dried by passing it over steam-filled rolls. The sulphuric acid dissolves the outer surfaces of the paper fibres into a sort of jelly, thus forming what the chemist would call an *amyloid*. When the action of the acid is stopped by the rinsing process, the interstices or holes of the paper are filled with this jelly. The paper has thus been changed from a sheet that was formerly instantly soluble in water into one that will not go to pieces in water.

When this treatment was discovered, about the middle of the last century, the originators were hard pressed for a name for this astonishing new paper. It looked so much like animal parchment, especially when wet, that they gave it the name "parchment," at that time, and, since all paper was being made from rag stock of vegetable origin, they prefixed the word *vegetable*. Today the paper is usually called "*genuine vegetable parchment*" to distinguish it from imitation papers that look like it, but do not have the same properties.

Adaptability to various conditions

The quickest and best way to test vegetable parchment is to soak it in water. It immediately becomes so soft and pliant as to appear even stronger wet than dry; but, whether the water is cold or boiling, it will not destroy the sheet or cause it to go to pieces. Vegetable parchment is likewise greaseproof or grease-resistant. Fats and oils, whether hot or cold, have no more effect on it than water, and some grades of parchment will permit no penetration whatever. These two inherent qualities—insolubility and greaseproofness—plus the fact that it is odorless and tasteless, account for the major uses of the paper in industries with problems of protection from moisture and grease.

The natural color of genuine vegetable parchment is white, but it is also available in colors. There is no problem of free fibre, lint, or fuzz with genuine parchment; consequently, parchment strips clean from any moist surface.

Parchment is not airproof. Both air and moisture can penetrate it to a degree which will permit the contents of the package to "breathe." This quality is particularly helpful in the case of such foods as fresh vegetables, certain meats, etc.

Special inks are used in the printing of genuine vegetable parchment, since the printing must not offset when used on greasy, wet, or briny foods. The inks must stand the boiling test, since in the dairy industry, butter wrappers and liners may be boiled before use. Most wrappers are printed, and a wide choice of designs in color in both letterpress and offset are available.

The weights of genuine vegetable parchment vary from 27 to 55 lbs., on the basis of 24 in. by 36 in.—500. In addition to colored parchment, waxed, coated, embossed, and crinkled forms are common. Treatments with various substances are also used to give certain desired properties.

Special uses

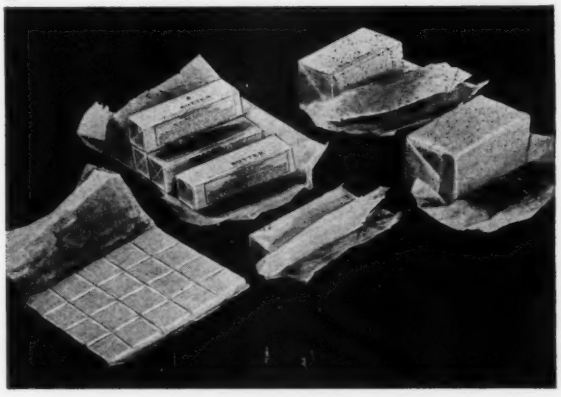
Meat—In the meat-packing industry (including poultry), where it is essential that protective wrappings are attractive, resistant to grease, and not disintegrated in contact with meat juices, snow-white vegetable parchment has been widely adopted. A special treatment, which helps to prevent rancidity, is used on wrappers for sliced bacon, lard, and other fatty products. To prevent meats from sticking to metal containers, tins for spiced ham and luncheon meats are lined with parchment. Crinkled vegetable parchment—i.e., a sheet

1. Parchment is useful protector for cheese packages of various sizes. 2. Perhaps the earliest parchment user, butter is in familiar sizes—patties, quarters, single- and double-wrapped pounds. Photo Kalamazoo Vegetable Parchment Co.

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3. Hours of boiling do not impair vegetable parchment's wet strength. 4. Parchment-wrapped fish reaches the consumer in good condition. Photos Paterson Parchment Paper Co. 5. Individual wrapping of poultry improves appearance, aids sanitation. Photo Kalamazoo Vegetable Parchment Co.

which has been creped or crinkled to increase its strength—is used in packing houses to line containers for boiled ham and for other purposes. Poultry packers use vegetable parchment—frequently printed—as a lining for crates which, when turned back over the edges of the box, forms an attractive display. Other uses include liners and covers for boxes and barrels, wrappers for tamales. Most containers for lard—cartons, pails, drums and tubs—are lined with parchment. Vegetable shortenings require the same protection.

Dairy products—In the dairy industry, vegetable parchment is widely used as a wrapping for butter because of its freedom from taste and odors, and its high strength and greaseproofness while wet.

Cans for milk and cream use parchment gaskets between the can and the lid to prevent contamination from various sources. Parchment hoods for milk bottles are common. Many types of cheese and bricks of ice cream are wrapped in parchment. In the case of the latter product, parchment offers the advantage of stripping clean from the ice cream, leaving no paper shreds.

Garden produce—Fruit and vegetable shippers use parchment as liners for boxes and crates or as individual wraps or bands for lettuce, carrots, celery, broccoli, spinach, sweet corn, etc.

Fish—The fish industry uses, parchment for fresh fillets, and the same sheet, waxed, for frozen fillets. The wax makes it easier to strip the sheet from the frozen product. A specially treated sheet of parchment is used as a lining by canners of shrimp, lobsters, crabs, etc., to prevent blackening of the contents from contact with the can.

Frosted foods—In the frosted foods industry, vegetable parchments, both plain and coated with paraffin or other materials, are used for fish fillets, fruits and vegetables. For liquid or semi-liquid packs the paper is first fabricated into a bag which is inserted into a carton and filled. The top is then folded over and heat-sealed.

Miscellaneous uses of genuine vegetable parchment include wrappings for grease-packed metal items like ball bearings—pads for permanent waving—wrappers and liners for oleomargarine—slap sheets and wrappers for the retail meat dealer or grocer.

Parchment paper is also being used extensively, now, in the lining of bags, fibre containers, etc., which replace tin and similar materials in the protection of a variety of moist and oily food products.

Certain parchments are also being used to wrap parts and replacements of military materials of highly polished metal which must be protected against tarnishing or rusting. Parchment provides an outer wrapper that is greaseproof, non-corrosive and sufficiently tough and strong to protect the part until it is actually placed in use.

Special sheets of genuine vegetable parchment have been developed to meet Federal specifications in this regard.

Printed transparent sheeting

When transparent, flexible films were first introduced into this country, their very novelty was enough to assure the interest, attention and buying action of consumers. With lower costs and wider applications, more was learned about their sales-stimulating powers, but when two or more similar products were competing in the same outlets in transparent packages, the need for distinctive appearance and an effective sales story became apparent.

In industry after industry, this cycle was repeated. First, the use of sheet wraps or bags followed by beautifully printed wraps or bags. Even on mass market, in the case of cheap, daily purchase items like bread, a growing trend was apparent toward the use of printed transparent wrappers—this in spite of higher costs than those involved with an unprinted wrap and a printed, waxed paper band label. The printing in this case increased display value in the store, made the loaf recognizable, even if only one end was visible on the bread display rack, and offered an ample opportunity to feature the brand name and dietetic advantages on each and every wrapper. Generally, its use was restricted to specialty loaves of special ingredients which commanded a higher market price than the standard white bread. The printed wrapper set the loaf out from its cheap competition even though the bread itself did not actually look any different.

Cranberries packed in printed transparent bags commanded a higher market and retail price, more than absorbing increased packing costs. The package protected the berries, giving them a longer display life, permitting convenient display throughout the grocery store and carrying the brand name into the home. The printed transparent bag converted a bulk, unbranded food into a fast selling, profitable specialty. Similar marketing revolutions have been put over with fresh tomatoes, machine-wrapped imprinted roll film over open-top folding boxes and with dried beans, packed in printed transparent bags and shipped over wide areas; both carrying the packers' trademark into the home and assuring the housewife of uniform high quality and sanitation.

The possibility of creating and reproducing highly artistic colorful designs on transparent films, should not blind us to the prosaic but highly successful performance of simple one or two-color printing jobs on these materials. As new films become available after the war, we

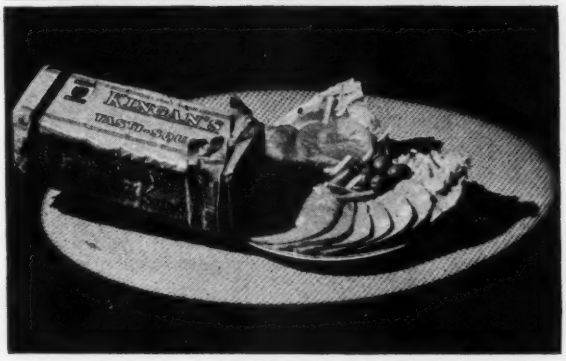
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1. Transparent wraps, printed in gold for wines, convey the impression of quality and genuineness. Photo The Dobeckmun Co. 2. Printed cellophane intensifies the appetite appeal of "Suchard Chocolates." Photo Milprint, Inc. 3. Before war needs pre-empted the supply, rubber hydrochloride sheeting demonstrated its value for both protection and appearance. Photo Goodyear Tire and Rubber Co.



4



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4. Swim suits are displayed in printed Pliofilm bag which becomes a good re-use container. Photo Goodyear Tire & Rubber Co.
5. Transparent shirt wraps make sales points, and prevent merchandise from becoming shopworn. Photo The Traver Corp.

can predict now the rapid development of printed applications.

In creating designs for transparent packages, the product itself becomes the background. This and other problems suggest the advisability of checking the design problem with the film converter early in the game. His design staff may suggest effective ideas which will improve sales appeal without imposing additional manufacturing problems. For example, "hit or miss" designs may be as effective as registered designs in a particular use but reduce costs and the need for electric eye control on wrapping machines.

The technical problems of printing have been solved in the past. We can be equally confident that the new ones imposed by new films will be answered as well just as soon as the manpower, equipment and chemicals required are released from war's demands.

In the order of their development, there are three major processes of printing on transparent sheeting. These are as follows:

1. Letterpress, which employs relief engravings and oil inks.

2. Gravure, in which impressions are made from etched cylinders with lacquer inks.

3. Aniline, using spirit inks and, usually, rubber printing plates.

Which process would be most satisfactory for the case at hand depends upon:

The art work—Most designs can be printed in any one of the three processes with striking results. However, art work involving fine halftone screen, soft tone work or color should be printed in gravure.

The nature of product—Certain products contain chemicals either inherent or added by processing which may attack the inks. For example, oil of wintergreen used in confections, such as mints, attacks certain aniline ink colors, whereas letterpress or gravure inks remain fast and, in the main, inert.

Packages for fruits processed with sulphur dioxide often employ the use of a protective metallic ink as a base for other colors.

The type of film used—While the type of film does not limit printing to any one of the three processes, the nature of the product and its handling in production and in the finished package form should be carefully considered in selecting film and printing.

Letterpress printing

This is the best known of all printing methods and is the one by which the first successful printing on transparent cellulose was accomplished. However, due to the temperamental nature of the film, really successful commercial production was not attained until roll-fed presses were employed. These required the addition of many devices, such as means of continuous control of the web, or sheet, during the printing operation, to insure registered printing of successive colors. Several types of roll-fed presses are presently in use. In some types, a number of printing or plate cylinders are arranged around a central platen cylinder and the printing is done on a continuous web, which is then delivered in the form of either sheets or rolls. Other types of presses cut the sheet to a predetermined size before the printing impression is made.

Letterpress printing may be done on either surface of the cellulose film and, where it is not objectionable for the printed side to come in contact with the product to be packaged, the use of reverse or underside printing permits the retention of the full gloss, or sheen, of the cellulose, thus enhancing and vivifying the colors of the inks. Letterpress printing is also employed almost exclusively where the printed cellulose is to be used on moist or greasy objects, notably on meats and fish.

Gravure printing

This process came into use only after letterpress printing on transparent cellulose had become fairly well standardized and its limitations had been explored. The inks

used are of the fast drying, lacquer type, which not only eliminate the use of slip-sheets, but permit the printer to obtain a degree of opacity impossible with oil inks, as well as to print color upon color in a continuous operation. The pigments used in gravure inks permit also, the obtaining of very brilliant full colors and shades.

Since gravure printing can only be done through the use of intaglio-etched cylinders, the cost of engravings for this process is relatively higher than for either letterpress or aniline printing and the combination of more than one design on a set of cylinders is impossible, unless all of the designs can be executed within the limit of the number of colors available on the press and unless each design, in repeat runs, can be produced at the same time and in the same proportion as to quantity as the original run. At present, presses are available where as many as seven colors may be produced at a single run.

The gravure method produces the highest type of printing at present available on transparent cellulose and particularly attractive effects are obtained through the use of reverse printing. Halftones can be satisfactorily reproduced, provided the tone work can be underlaid with a neutral color, such as white. Gravure printing is not recommended for use where the product to be packaged is greasy or has a high moisture content.

Aniline printing

This type of printing is the latest to come into use on transparent cellulose. Because it is generally done through the use of rubber, rather than metal printing plates, and because it employs fast drying inks, eliminating the necessity for slip-sheeting, it was originally hailed as a means of producing printed cellulose more economically than the older processes. However, the limitations of the processes and inks originally employed made aniline printing less satisfactory from the standpoint of package appearance and users of printed cellulose were loath to adopt it, even at somewhat lower costs. Since aniline printing was originally introduced, much progress has been made, notably just before the war, in improving the results obtained and some highly creditable work had already been done by this process. Naturally, this has involved the use of more expensive materials and equipment. The cost of aniline printing today is probably on a par with that of letterpress.

Tone work in aniline printing is possible only to a very limited extent and its use on moist or greasy products, particularly foods, is somewhat questionable. It does give excellent opacity, brilliant colors and, particularly in surface printing, a lustre that is superior to that of either letterpress or gravure.

The development of methods of printing transparent film in continuous rolls has contributed largely to the expanded use of such wrappers in mechanical packaging. Starting with the wrapping of bread, this application has spread into many fields. Controlled cut-offs, made possible by the use of photo-electric cells, permit "spot" wrapping the printed film on cartons or open-faced trays. Photo-electric cells also permit the use of printed transparent rolls on automatic machines.

General information

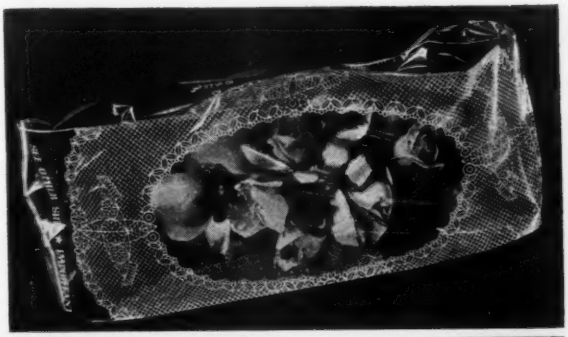
Tints—Both gravure and aniline inks may be used in producing tints on transparent cellulose. A wide range of colors is available and the tints do not impair the gloss of the film. They alter its transparency only as the color of the tint reacts on the color of the product packaged. Letterpress tints are generally unsatisfactory.

Opacity—As mentioned in preceding paragraphs, gravure and pigmented aniline inks produce impressions of greater opacity than letterpress, although the latter gives a degree of opacity suitable for many purposes.

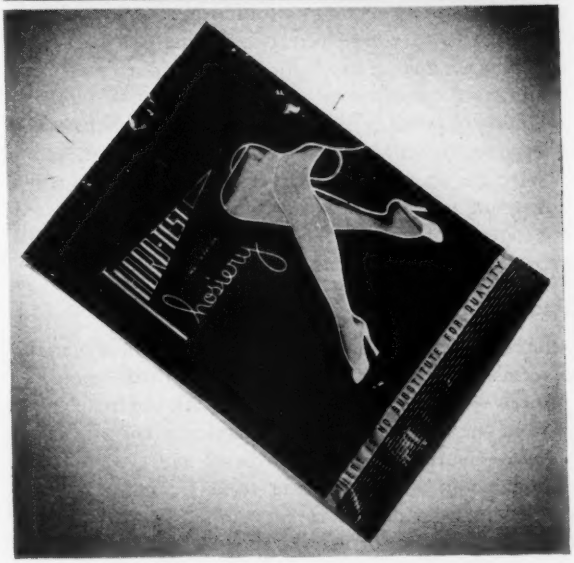
Metallics—The gravure process is pre-eminent for printing metallics. Brilliance or opacity can be obtained with a single impression, although two layers of color may be employed where extreme opacity is desired. Letterpress metallics are very satisfactory in surface printing, where the metallic may be underlaid with a sizing, as of yellow in the case of gold, or white in the case of silver. Where reverse printing is employed, letterpress metallics cannot be underlaid and are correspondingly lacking in opacity. Satisfactory metallics for

6. Delicate, lacy, one-color design printed on transparent sheeting enhances the natural beauty of this corsage. Photo the Dobeckmun Co. 7. Black printed cellophane envelope has transparent portion which gives instant information about product, color and grade. Photo Milprint, Inc.

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8. Printed cellophane is inexpensive package for low-cost grocery items. Photo E. I. du Pont de Nemours & Co., Inc.

aniline production have not as yet been developed.

Reverse printing—All three printing processes may be employed to produce reverse printing, although letterpress is inferior to either gravure or aniline for this purpose, except where solid lays of full color are used.

Register—Where fine register is required, the letterpress process is superior to either of the others. The use of metallic plates, giving sharp, controllable register, permits the production of effects not possible with either gravure or aniline. Where the design is such that color may be superimposed on color, register often is of negligible account in gravure or aniline work.

Tone or screen work—Bendays and halftones are well within the range of most good producers of letterpress printing on transparent cellulose. Halftone work is possible to a considerable degree in gravure, with a range of benday screens or stipple effects also available.

With the amount and character of the research work now going forward in the field of cellulose printing, it is not too much to expect that four-color process work will eventually be done on this material.

Package forms

Printed transparent cellulose is available in a variety of forms, the better-known of which are listed below:

Sheets—These are available in any type of film, printed in from one to seven colors, in practically any size.

Rolls—Continuous printed rolls of any type film are obtainable in widths ranging from 1/4 in. to 36 in., printed in from one to seven colors. Printed designs may be continuous or may be spot-registered for use on automatic packaging machines, where the printed design is accurately located on the package by means of a photo-electric cell device or an "electric eye."

Bags—Single- or double-wall bags of transparent cellulose, printed in from one to seven colors, are available in flat, square and satchel bottom styles. Nearly all types of film may be employed in their construction. Sizes range from very small bags, in the flat type, up to 10 in. by 18 in. in the satchel bottom style.

Envelopes—Both die-cut and roll-cut styles are available in a wide range of sizes with either side or end openings and with printing in any number of colors up to seven. Most types of transparent cellulose can now be successfully fabricated into envelopes.

Specialty packages—Tubes for cigars and other slender objects, such as tooth brushes, are available, printed in as many as seven colors and in most types of film. Other packages, combining printed cellulose faces with backs or affixed pieces of board or other material, may also be had. Sheets or rolls of printed cellulose, affixed at one or both sides to corresponding sheets or rolls of foil, glassine and other materials, are available. Other types of packages employ sheets or rolls of printed cellulose in combination with folding cartons or with fibre plates or trays; in some instances, such combination packages are supplied with retaining rings or other essential parts to make a complete package.

Laminated printed cellulose—This comparatively new development is treated at greater length elsewhere in this book. For the purpose of this article, it may be said that printed cellulose, laminated to a variety of base materials, is available in sheets, rolls, specific types of bags and folding cartons.

Window-faced wraps—These have been developed essentially as a means of combining the advantages of opaque and transparent materials for wrapping purposes. They are formed by pasting together continuous alternate strips of paper and transparent film. In most instances, moistureproof cellulose and greaseproof glassines are combined. They are widely used in the baking industry.

9. Fruit of the desert in printed, transparent package with powerful appetite appeal. Photo Venus Packing Co.



9

XUM

Protective coatings—technical aspects

by Robert Gordon

Practically all of the resins and film-forming materials mentioned in this article have long since gone to war. These materials have been utilized wherever they fit and wherever they could release other strategic materials for more important requirements. Resins have made it possible to build airplanes and gliders without metal, raincoats without rubber, shoes without leather, fabrics without cotton, windows without glass and to obtain direct substitutes for many materials, the supply of which could not be increased sufficiently to meet the demands of our war effort.

Without the prewar development of resins and without our ingenuity in substituting and developing the uses for these materials, we surely would have been in a position which is commonly known as "behind the eight-ball," with respect to necessary war materials especially after our losses in the Pacific and the Far East.

It is little wonder, therefore, that these materials were, for all practical purposes, cut short for civilian use. Most of the resins have been placed under strict allocation by the WPB. Restrictions have not only been caused by war demand for the finished resins, but also because of the limited amounts of raw materials necessary to manufacture them.

The shortage of acetic anhydride, for example, has curtailed the production of cellulose acetate; the scarcity of nitric acid has reduced the production of nitrocellulose; the output of the vinyl-type resins has been hampered by the shortage of the monomers; that of phenol-formaldehyde resins by shortages of phenol, cresols and cresylic acid; while production of modified isomerized and chlorinated rubber has been restricted by the lack of rubber.

The greatest blow to packaging came when metals were restricted for use in cans and collapsible tubes. Almost every marketable item was hit between the eyes. At first, the industry floundered desperately, but it finally rallied and turned more and more to using glass and paper coated with protective materials in place of tin cans. Sealing, moisture-vapor transmission, water and oil resistance were the big headache with paper, but these difficulties were overcome to a great extent by whatever resins were available and by the less strategic waxes.

Conversion difficulties

The conversion from metal to glass and paper would not have been as difficult in itself had there been enough equipment and resins available to make the change. Packing in glass was not new by any means. Paper containers for liquids had been in development at least five years before the war started, and the biggest commercial use for such a container was for milk. Paper oil containers, too, have been seen on the market in prewar days, but tin was doing too good a job for a revolutionary change. The war, however, made the change necessary.

As mentioned above, many of the organic solvent-soluble resins and film-forming materials are no longer available for civilian packages. There are, however, some water-soluble materials, such as glues, casein, alginates, silicates, polyvinyl alcohols and methyl celluloses which are available, excepting for the latter two perhaps, and which can be readily employed in treating paperboard for oil resistance. Such materials must subsequently be protected by means of a varnish or wax from being affected by water and moisture.

As for the collapsible tube, regenerated cellulose and cellulose acetate came to the rescue of metals. Although these materials were easily converted for use as tubes, protection by means of some type of coating against moisture and oil had to be applied to them in order to make them as practical and as resistant as the metals. Resins and waxes again played an important part in providing the essential resistance necessary in the tube.

One interesting innovation in packaging liquids and other materials, which can be considered as a "war baby," is a fabric liquid container, developed by Standard Brands, Inc., which won an award in the twelfth All-America Packaging Competition. It is a fabric, coated with a heat-sealing and resistant material. The seams are made by heat sealing and the bag is packed in an ordinary corrugated container. This package has shown exceptional possibilities, and interest in it is growing steadily. Several articles on this package have already appeared in Modern Packaging.

Trends in coating

To understand coating materials, it may be interesting to trace briefly their beginnings. The word "lacquer" is derived from the Hindustani "lakh," meaning 100,000. It was originally given because of the thousands of insects whose resinous secretion was and still is the basis of many shellacs and natural gums.

Applying a protective or ornamental lacquer finish to wood, paper, metal or fibre is not new. It has been an art for centuries in China.

Whether a protective coating is classified as a varnish or a lacquer depends upon its method of drying. A lacquer dries purely from the evaporation of volatile solvent from the solution. A varnish dries chiefly by a chemical reaction known as oxidation.

Spirit varnish, therefore, really can be classified as a lacquer, but it is more like the lacquers used centuries ago than those classified as lacquers today. The latter are for the most part solutions of various gums and resins in alcohol.

The value of these spirit varnishes is due chiefly to their quick-drying qualities and low cost. In most instances, where only a limited amount of protection is desired,

these spirit varnishes are adequate. However, they have indubitable faults, such as a tendency to soften in warm weather and to crack in cold. Resistance to abrasion is another quality which is usually sadly lacking in these varnishes.

Thus, it is not surprising that developments of new synthetic materials, such as rubber derivatives, vinyl, methacrylate resins and cellulose derivatives are looked upon by the packaging industry with keen interest. In these new materials are new ideas and trends, new style, new methods, new beauty and new protection previously unknown. Applications of overprints are no longer being made merely for the sake of enhancing the appearance of a package or wrap, but also to incorporate such protections as resistance to oils, moisture, acids, alkalis and the elements. In almost all cases, the new materials give a good-looking finish, so that their effect on appearance is taken for granted and is subordinated to their protective properties.

Today many liquids and oils are being packed in paper containers. Many industries are effecting economies by the use of coated papers. Coatings have been used to protect whiskey labels from the effect of alcohol; soap wraps from discoloration and fading due to alkalis; oil labels from being stained by the oil; salt and cocoa from becoming caked by moisture in their containers.

Advantages of the new synthetics

One distinctive advantage of these new synthetic resin materials is their ability to seal with the aid of heat and pressure. Speed in production is increased greatly since the seal sets as soon as the temperature at which the seal was made drops a few degrees. Their bonds are stronger, more flexible, waterproof and do not deteriorate with age.

These rapid strides in the development of the new resins and their uses in packaging have been brought about by carefully planned and directed research. Traditional methods are becoming "has beens." Wideawake and alert companies who desire to keep up with these modern trends cannot afford to overlook the new possibilities which these materials offer to industry. A brief résumé of the new materials, their method of manufacture and uses for packaging follow:

Rubber derivatives

Rubber in one form or another has always been used for water- and vaporproofing. However, its high viscosity, residual tack, lack of transparency and its general difficulty in handling have made it practically useless as a protective coating for paper. Through modern methods of research, a resin has been developed from a very high grade of rubber, which can be handled very much like any other coating solution adaptable for application to paper. Moreover, this resin, which is a cyclicized derivative of rubber, is an improvement over the raw rubber in water- and vaporproofness. It is soluble in a variety of aromatic and aliphatic hydrocarbons and leaves a clear, glossy, transparent, heat-sealing film highly resistant to moisture, acids, alkalis and alcohol. It contains no chlorine.

Another rubber derivative very suitable for use as a paper coating is a product known as chlorinated rubber or rubber chloride. It results from the reaction of chlorine on rubber in which the chlorine content may vary from 61.5 per cent to 68 per cent. The theoretical calculation of the chlorine content is generally higher than the practical since crude rubber is made up of a soluble portion which is very reactive and a gel portion which is much less reactive.

Both the above-mentioned rubber derivatives are extremely useful as protective coatings where good resistance to moisture penetration, acids and alkalis is desired. They can be formulated to produce good, flexible films with excellent gloss retention. The cyclicized rubber derivative, however, is more suitable for heat-sealing purposes, since it is more stable to heat than the rubber chloride and is produced in various grades with various

GENERAL RESISTANCE

	Cyclicized Rubber	Chlorinated Rubber	Vinyl Copolymer	Polyvinyl Acetate	Acrylic Resins	Nitro Cellulose	Cellulose Acetate	Ethyl Cellulose
Acids Weak	excellent	excellent	excellent	good	good	fair	fair	fair
Acids Strong	excellent	excellent	excellent	good	good	poor	poor	poor
Alkalis Weak	excellent	excellent	excellent	good	good	poor	poor	excellent
Alkalis Strong	excellent	excellent	excellent	good	good	poor	poor	excellent
Salt Spray	good	good	excellent	good	fair	poor	poor	fair
Alcohol	excellent	good	excellent	poor	poor	poor	poor	poor
Gasoline	poor	good	excellent	good	fair	good	good	poor
Mineral Oil	poor	good	excellent	good	fair	fair	good	fair
Vegetable Oil	poor	poor	excellent	good	fair	poor	good	poor
Animal Oil	poor	poor	excellent	good	fair	fair	good	poor
Essential Oil	poor	poor	poor	poor	poor	poor	good	poor

PHYSICAL PROPERTIES

	Cyclicized Rubber	Chlorinated Rubber	Vinyl Copolymer	Polyvinyl Acetate	Acrylic Resins	Nitro Cellulose	Cellulose Acetate	Ethyl Cellulose
Specific Gravity	1.07	1.57	1.35	1.20	1.18	1.65	1.27	1.14
Specific Volume, In.³/Lbs.	26.0	16.98	20.6	24.2	23.3	16.26	20.2	23.91
Color	very light	light brown	water-white	water-white	water-white	very light	water-white	very light
Odor	none	none	none	none	none	none	none	none
Taste	none	none	none	none	none	none	none	none
Flammability	none	low	none	none	none	high	none	low
Heat Seal	excellent	poor at high temp.	excellent	excellent	excellent	fair	fair	good
Resistance to Aging	fair	fair	excellent	excellent	excellent	poor	excellent	excellent
Water Resistance	very good	very good	very good	poor	good	fair	poor	poor
Water Vapor Impermeability	excellent	excellent	good	poor	fair	good	poor	poor
Toxicity	none	none	none	none	none	none	none	none

melting points. Both of these materials are unaffected by alcohols, but are attacked by gasoline. Their use on glassine or other hard-surfaced papers has given results which make these coatings extremely useful in packaging where high moisture resistance is required. On glassine paper, the cyclicized rubber derivative is used with as little as $1^1/_2$ lbs. per 3,000 square feet of solid coating on each side of the paper to give moisture-vapor transfer rates of from 1 to 5 grams of water per square meter per 24 hours at a relative humidity differential of 100 to 0 per cent, compared with the uncoated paper, which has a moisture-vapor transfer rate of over 1,000 grams per square meter under the same conditions. This same cyclicized rubber derivative is also used on kraft paper to give a high strength sheet which is very resistant to the passage of moisture. This sheet has a high finish, is heat-sealable, and offers many opportunities for using high strength paper in the field of large commodity bag packaging.

Uses of rubber derivatives

The outstanding advantage of these coatings is that they are non-toxic and usable for food packaging where high moisture resistance is required to prevent caking of such items as salt and cocoa or to prevent staleness of biscuits, corn flakes, potato chips, pop corn, etc.

The chemical resistance of these rubber derivatives allows for wrapping and packaging of such materials as soaps and detergents and prevents discoloration of the wrap by the alkalis.

Vinyl polymers

Vinyl chloride and vinyl acetate are formed by passing acetylene through hydrochloric acid and acetic acid, respectively. The molecules of these compounds are characterized by the possibility of joining together with other like molecules to form larger molecules possessing the same empirical composition. Thus, when vinyl chloride and vinyl acetate are each treated with catalysts, they are polymerized to form polyvinyl chloride and polyvinyl acetate, respectively. This chain reaction can be controlled to various degrees of polymerization and the degree of polymerization determines the average molecular weight, as well as some of the important properties of the polymer.

Polyvinyl chloride is strong in tensile strength, has good chemical and water resistance. However, it has poor solubility in most organic solvents and is, therefore, limited in its use for a surface coating.

Polyvinyl acetate, on the other hand, has properties which are quite different. Its softening point is as low as 30 deg. C. and it has a high water absorption and tacky nature. It is more useful, consequently, as an adhesive rather than a surface coating.

A joint polymerization of these two compounds simultaneously, however, with a content of about 85 per cent to 87 per cent vinyl chloride, yields a product which is soluble in many organic solvents suitable for use as mediums for adapting the resin for surface coating. What actually happens is that the vinyl acetate, when polymerized together with the vinyl chloride, internally plasticizes the polyvinyl chloride while retaining most of the properties of the polyvinyl chloride.*

A large variety of compounds can be made with varying properties by the copolymerization of these two materials, by controlling the average molecular weights and by altering the vinyl chloride to vinyl acetate ratio.

Uses of the vinyl resins

Vinyl resins of this nature find their most extensive uses in paper coatings where good resistance to acids, alkalis, oils, gasoline and alcohol is required. They have already found successful application in paper liners for bottle caps, fiber containers for holding oils, fibre

* These copolymers of vinyl acetate and vinyl chloride are manufactured and sold under the name of "Vinylite."



Fig. 1. Diagram of varnishing machine for sheet coating.

cartons used for packing nitrocellulose which is kept wet with denatured ethyl alcohol, labels and box papers for improving the appearance as well as for resistance to the above-mentioned materials.

Vinyl resins in general have excellent heat-sealing properties, water resistance, are non-toxic, odorless, tasteless and practically water-white. This makes them ideal for use in food containers and wrappings. They have been used for packaging dairy products, such as butter and cheese, and they have also been used on the hoods for milk bottles.

The vinyl acetate polymers have extremely high thermo and cold adhesive qualities, and are quite extensively used as adhesives in the packaging field. They, too, are non-toxic, odorless, tasteless and colorless, but the water absorption is rather high. However, water does not dissolve polymerized vinyl acetate. This type of resin is used for sealing paper milk containers, paper drinking cups for both hot and cold liquids, as well as a seal for cellophane and cellulose acetate film. It can be coated by the regular methods and it makes excellent heat-sealing papers.

Methacrylate resins

The methacrylate resins also belong to the vinyl group, chemically speaking, and are made basically from coal, air, water and petroleum. These resins are made from various esters such as ethyl, methyl, butyl and isobutyl derivatives.

To date, the most extensive use for acrylic resins has been in molding. However, they are soluble in a large variety of solvents and are suitable for coating. The ethyl methacrylate, however, is probably the best suited for this work, since the methyl polymers which are used chiefly in plastics are too hard and brittle for coating. The butyl polymers, moreover, are too soft and sticky for such applications.

The acrylic resins are water-white, thermoplastic and have good resistance to water and inorganic chemicals. They have not been fully explored as yet in this particular field, inasmuch as they have been very costly.

Polystyrene resins

Polystyrene resins, also known as vinyl benzene, have ideal potential properties for protective coatings. However, their one drawback is their hardness and lack of flexibility. Formulating chemists have spent many patient hours trying to make a usable, flexible polystyrene coating.

Cellulose derivatives

Nitrocellulose, ethylcellulose and cellulose acetate have also been used to a great extent for coatings of paper. However, their usefulness is much more limited than the other thermoplastic, high molecular weight, film-forming resins mentioned. Good moisture-resistant nitrocellulose lacquers and fair oilproof cellulose acetate, as well as good thermoplastic coating from ethylcellulose, have been made. However, these materials do not have as many inherent physical and chemical properties as do the thermoplastic resins. They have to be modified in so large a measure by other ingredients that, in many cases, they lose their advantages. In paper work, these materials have found large uses in coated labels and

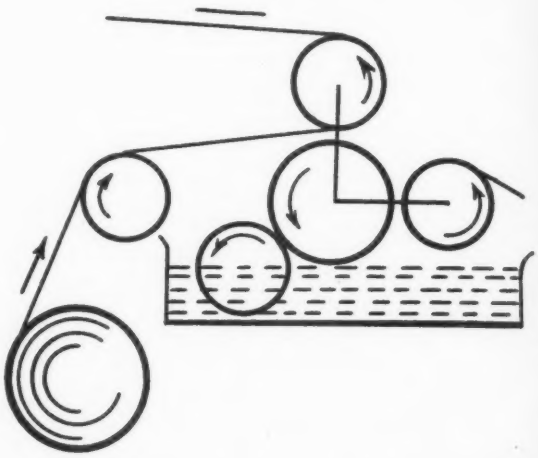


Fig. 2. Reverse roller type coater has a roller about half submerged in a tank which is filled with lacquer.

fancy box papers. Moistureproof nitrocellulose lacquers have been used on both cellophane and glassine with good results. The one outstanding disadvantage of nitrocellulose lacquers is their high rate of inflammability. This requires extreme care in handling and storing.

In general, all coatings mentioned give good scuff-proofness and good gloss, which enhance the appearance and serviceability of the package.

The thermoplastic type of materials is best suited for heat-sealing work and bags can be made and sealed only with heat and pressure. In general, temperatures of approximately 300 to 400 deg. F. are required.

The above statements are all relative and general. The efficiency and advantage of any of the mentioned materials will depend upon the precise development by the lacquer manufacturers of these materials for particular

uses. In application, the lacquers made from these new synthetic bases vary little from the conventional methods of coating. However, certain facts must be taken into consideration if the best protection and appearance are to be obtained. First, let us consider briefly some of the established methods of application, their shortcomings and the modern trend to improve these methods.

Varnishing machines

Coating in sheets is generally accomplished on a so-called varnishing machine, which consists of a reservoir in which the liquid is poured. Running in this reservoir is a distributing roller with an attached doctor roller, which regulates the amount of coating to be applied to the sheet. The sheet is drawn over the distributing roller by means of a large revolving drum equipped with grippers. These grippers hold the sheet firmly to the drum as it revolves. At the same time, they draw the paper over the distributing roller with the regulated amount of coating. The sheet picks up the coating, is then released on an endless belt and carried through a heated oven to be dried. See Fig. 1.

Although this type of equipment has served the industry successfully for years in applying spirit varnishes chiefly for good appearance without much damage, a little more careful handling and thought to details must be given if coating by this method is to be used successfully for protective application. Like the chain with its weakest link, the protective quality of the finished product is only as good as the continuity of its film. Pinholes, bare spots and not enough coating render the sheet useless from this point of view.

The machines have been modified to the extent of varying the speeds of the distributing roller, so that the sheet wipes against the roller instead of kissing it.

The modification tends to eliminate any streaks in the coating and to provide for more uniformity and a wider range of thickness control. Another modification has been to reverse the distributing roller in such manner that it runs in the opposite direction to the motion of the large drum and the sheet and thus lays down a smooth streakless coat. This is, perhaps, the best method. However, since the operating details have not as yet been satisfactorily worked out, more information is not available at present.

Reverse-roller equipment

The second method to be discussed is the reverse roller coating equipment, of which there are several different types for production in the web or roll, rather than sheet. At present, there is no question about the merits of this type equipment. With these machines, accuracy and uniformity can be obtained satisfactorily without much difficulty.

One reverse roller type of machine consists essentially of a roller about half submerged and operating in a tank filled with lacquer. The paper runs over this roller in the opposite direction to its motion, picks up the lacquer and is carried between rwo rollers attached in wringer fashion. One of the rollers is stationary and revolves in the direction of the paper. The other roller is adjustable and operates in reverse direction to the movement of the paper. To the adjustable roller is attached a doctor blade which wipes down the excess lacquer which is picked up from the paper. Very accurate results for the weight of coating can be obtained from a machine of this type. In fact, actual calculations of the amount of coating to be applied can be determined before operation starts. See Fig. 2.

Another popular type of reverse roller coater has a roller operating in a lacquer bath. To this roller is attached a distributing roller, which picks off the lacquer from the roller in the bath. To the distributing roller are connected two adjustable auxiliary rollers at approximately 90 deg. from one another. One of these auxiliary rollers has a doctor blade attached to it, operates in reverse of the distributing roller and regulates the amount of lacquer on the distributing roller. Between the second auxiliary roller and the doctored-off portion of the distributing roller, the paper passes also in a direction opposite to the rotation of the distributing roller. See Fig. 3.

Rotogravure

Rotogravure printing is also being used to apply lacquers to paper in web form. Recently presses have been designed with closed fountains, which are ideal for lacquer work. However, rotogravure applications of lacquer for protective work have limitations: first, in the amount of coating applied and, second, in the continuity of the film. The lacquer is applied by means of etched rollers. The formulation of the lacquer must be such that it forms a uniform film before drying.

Baking

After the lacquer is applied, the sheets or web pass through a heated oven. These ovens are generally 30 to 40 ft. long and are constructed of sheet iron lined with asbestos. The source of heat is either the open gas flame, steam coils, hot air or, more recently, infra-red lamps. Of all these, the open gas flame is the least desirable, since it affords a definite fire hazard when used with lacquers.

Although many of the lacquer bases are non-inflam-

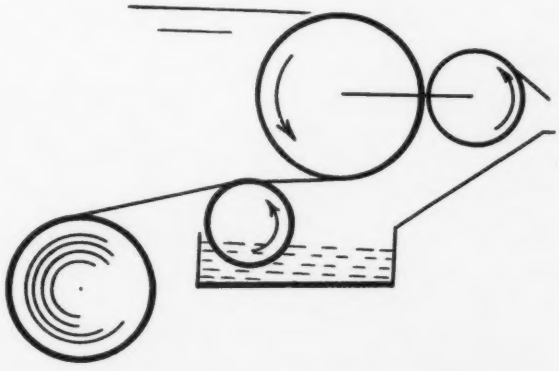


Fig. 3. Another type of reverse roller coater has a roller, operating in a lacquer bath, attached to distributor.



Full view of coating machine, drying tunnel, cooling and windup where the heatseal application is made on the cellophane surface of the mounted war packaging material. Photo Reynolds Metals Co.

mable, the solvents used in them will flash at relatively low temperatures. The other types of heat are safe and, with such other necessary precautions as adequate ventilation, static control and proper electric equipment, little if any danger is to be feared from the fire hazard.

A recent innovation in designing ovens has come about by the use of synthetic coating materials. It has been found that thermoplastic compounds will flow out when sufficient heat is applied to make them melt. Since the heat required to bring about this change of state is generally high enough to scorch the paper, the heat is applied only for an interval of 5 to 10 seconds, depending upon the amount of heat used. In most cases, about 400 deg. F. is used for 5 to 10 seconds after the heated sheet has passed through the regular oven at 150 to 200 deg. F. The result of this flask bake is a beautiful, smooth, high-gloss finish on the paper.

With infra-red lamps, no ovens are required, since the air is not used as a medium for conveying the heat energy. Infra-red lamps give off rays which are not absorbed by air. The efficiency of this method, however, depends on the material being heated. That is, if the material has the ability to reflect or transmit rather than to absorb these radiated rays, no amount of drying time will be adequate. However, if it does have the ability to absorb these rays, excellent drying facilities by this method can be arranged. Paper absorbs only a small amount of these rays, especially if the paper is white, and it is believed to be an impractical method of drying lacquers efficiently on paper.

Selection of paper

The selection of the proper grade of paper is of vital importance to obtain maximum results. A grade of paper not suited for lacquering is extremely costly and the results are inadequate. Too much emphasis cannot be placed on the selection of paper stock. In considering paper for a protective lacquer, it must be remembered that it is only the film formed above the fibres that gives the most effective protection. Consequently, it goes without saying that papers which allow the least amount of coating to penetrate into the surface of the sheet are best.

A convincing illustration of this fact was demonstrated in work with moistureproof lacquers. In an application of approximately $1^1/_2$ lbs. of solids on each side of a glassine sheet over a 3,000-sq. ft. area, a series of readings were obtained between 0 to 5 grams of moisture-vapor transmission per 24 hours per square meter. In an application of coating to a paper stock that was picked at random, but which was being used for lacquering, readings were between 50 to 60 grams of moisture penetration. It wasn't until about 3 to 4 lbs. of coating were applied to each side that favorable readings were obtained for the paper picked at random. Furthermore, an additional amount of coating on the glassine sheet gave no better results than the initial amount stated above. Thus, there is a limit to the amount of protection you can get and this maximum limit can be obtained much quicker and at a greater saving with the proper paper. It is much cheaper to treat a paper properly in the mill for good lacquering results than to apply an excess of lacquer to make up for the deficiency of the paper.

Paper to be used for lacquering should have a hard surface free from pores, grooves and standing fibres. In most cases, a supercalendered sheet or a coated sheet produces the best results. The coated sheet is superior, however, to the supercalendered sheet, inasmuch as there is less penetration into the paper. However, great care must be used in the selection of a coated stock. The coating should be hard but flexible, since the lacquer film will crack if the paper coating cracks upon flexing.

In buying competitive lacquers the purchaser should obtain the following salient facts in order to evaluate them on a dollar-for-dollar basis:

1. Knowledge of what you want the lacquer to do.
2. Weight per gallon.
3. Percentage of solids per gallon.
4. Specific gravity of solids or how far it will go per unit of thickness.

Lacquers, in many cases, can be formulated to give you the best results for certain types of protection. It takes much less lacquer to do the best job, if you select one specifically designed. Knowing the weight per gallon, the percentage of solids and the specific gravity of the solids, you will be able to evaluate the cost of competitive lacquers—assuming, of course, that their properties are equally good.

Wax—versatile protector

Without an oil well, today's protective paper packaging would be almost impossible. Petroleum waxes are the backbone of waterproof and moistureproof papers. With few exceptions, they are among the best non-metallic materials known for resistance to transmission of water vapor.

They coat paper milk containers, butter cartons, bread wrappers. They protect cheeses, frozen foods, dehydrated foods, meats, crackers, tea, coffee, chewing gum, cigarettes and candy. They preserve a soldier's rations and keep his ammunition dry. They protect guns and machine parts from corrosion.

Attention is focused on waxes today because of their role in paper packaging taking the place of steel, tin foil and other materials now permitted only for the most essential uses.

The present use of waxes in packaging is the result of years of development that goes back as far as the first waxed papers used by National Biscuit Co. at the turn of the century for the inner wrap of their Uneeda Biscuit package which took crackers out of the cracker barrel and put them into individual consumer packs. It goes back to the early wax-dipped inner wrap for Cracker Jack. These same wax packages with certain improvements are still used today.

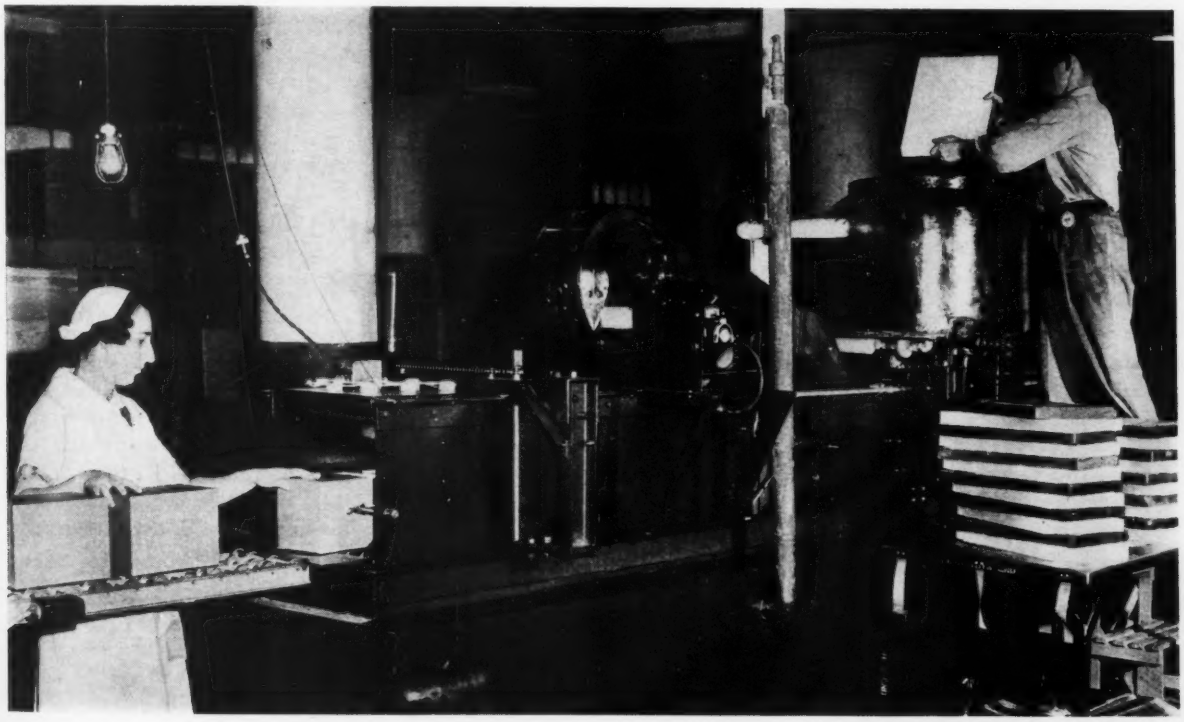
To understand the use of wax treatment of paper, one must first know something about paper. Paper consists of countless cellulose fibres felted together and bonded by a sizing to make a continuous contact of cellulose to cellulose throughout the sheet, with minute openings between the fibres. Water (liquid) will pass through these interstices, rather than along the fibres. Moisture (water vapor) on the other hand, is transmitted by the cellulose fibres as well as through the interstices, since the cellulose fibres are hygroscopic and can actually remove moisture from the surrounding air.

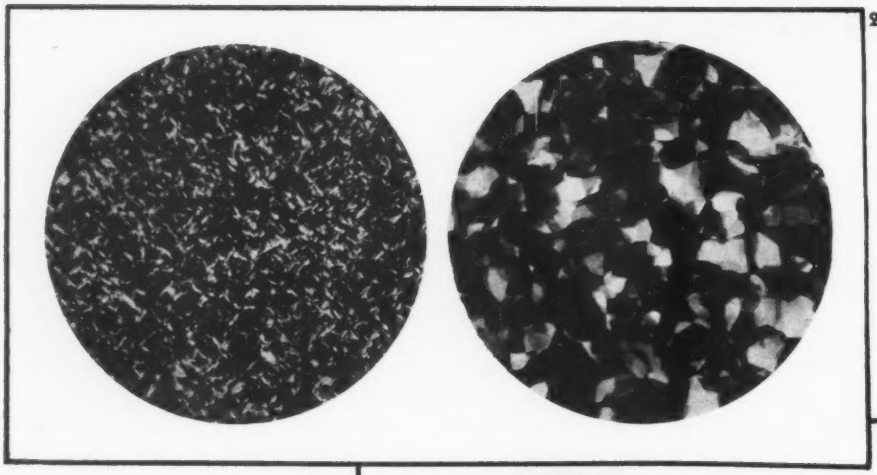
Paper may be made water tight by filling up the minute openings between the fibres with wax. This may be done in the paper industry by what is known as *dry-waxing*—driving the wax into the paper, with little, if any wax remaining as a surface film.

This method, however, though it fills the pin holes with wax, does not completely cover the cellulose fibres and many protrude above the surface like "fuzz" or wicks which absorb the moisture from the more humid size of the sheet and carry it along the chain of cellulose fibres to the dry side. Dry-waxing, therefore, is not capable of producing a completely moistureproof sheet. This can be done, however, by *wet-waxing*—or applying the wax as a surface film, with only enough wax impregnated into the paper to provide a bond to it.

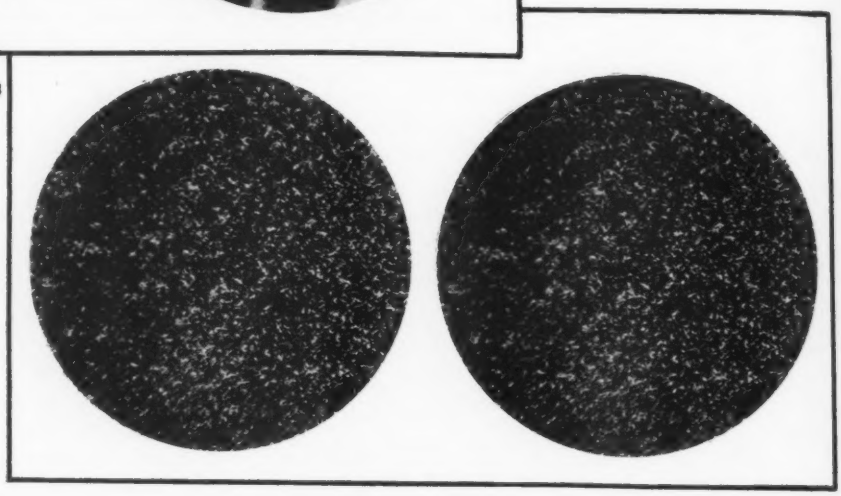
A third method of imparting both waterproofness and moistureproofness to paper may be obtained by laminating two sheets of paper together with a layer of wax—

1. Double-dipping equipment at American Chicle Co. First coat impregnates container, second gives a smooth surface.





2. Microphotos of paraffin wax. Left: before aging. Right: after aging. Note changes in crystallization. These changes make paraffin waxes unsuitable to use for certain purposes.



3. Microcrystalline waxes, on the other hand, are relatively stable and show practically no change in crystallization before and after they are similarly aged for a comparable period of time.

this provides a continuous barrier protected from careless handling or abrasion by a durable ply on each side of the barrier.

The wax film may be part of the carton structure as an outside or inside coating, or as a laminant. It may be used in a liner or as a wrapper. No fixed rules can be established for the type of package to be used for a specific application without careful study of the factors involved and a determination of the combinations best suited to each case. However, one objective must be maintained—a sturdy continuous wax film.

Petroleum waxes used in the packaging industry are of two types—paraffin waxes and microcrystalline or amorphous waxes as they were called before their minute crystalline structure was known. While they are both composed of paraffinic hydrocarbons, they are quite different in their physical characteristics.

While both of these waxes are products of petroleum refining, their difference is due to the fact that they are separated from entirely different fractions of crude petroleum.

Paraffin wax is removed from distillates or overhead stocks by sweating or solvent separation. The micro-crystalline grades are separated from residual stock by separating the petrolatum from these stocks by centrifuge or solvent separation and then further treating the petrolatum by selective solvent separation or recentrifuging.

As microcrystalline waxes thus removed are dark in color, it is necessary in some cases to decolorize them in varying degrees to meet the requirements of specific uses. Very little difference is found in different shades of the same microcrystalline wax.

Paraffin waxes have lower boiling points than the microcrystalline waxes and are therefore lower in molecular weight which probably accounts for the melting point range of paraffin wax being lower than the melting point range of microcrystalline waxes. In general paraffin wax melts from 100 deg. F. to 150 deg. F. and has a refractive index of approximately 1.43 at 75 deg C.; microcrystalline waxes vary in melting point from 140 deg. F. to 200 deg. F. and have a refractive index of approximately 1.45 at 75 deg. C. There are, however, some waxes of both types which do not fall within these limits due to novel methods of manufacture or to idiosyncracies of the crude oil from which they are derived.

The different melting point grades of both petroleum waxes are made by adjustments in the manufacturing process and are also due to the nature of the crude being run.

The important properties of petroleum waxes are their high resistance to water-vapor transmission, their practical freedom from odor and taste, their change from solid to liquid state over a very small range of temperature, their relatively low visoscity in a liquid state immedi-

ately above their melting point and their chemical inertness. In addition to these properties common to both waxes, microcrystalline grades have excellent adhesive qualities, are quite flexible in thin films over a wide range of temperatures and are characterized by high melting points valuable for certain purposes.

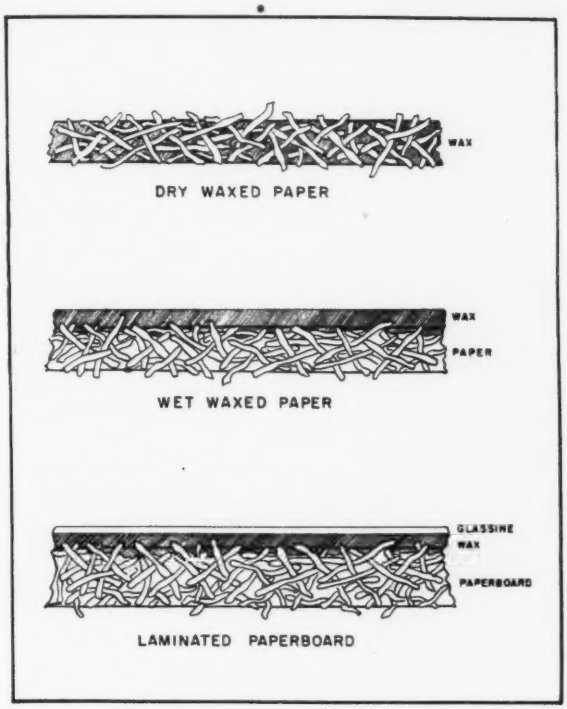
On the flat sheet there is very little difference between the water-vapor transmission rates of paraffin and microcrystalline waxes, but the latter is said to be superior on a creased sheet or one that must stand crumpling or rough handling during its protection period. The property of microcrystalline wax is obviously due to its flexibility in thin films whereas the paraffin is quite brittle.

Commercial wax papers are being produced which have water-vapor transmission rates as low as 0.2 gram per 100 sq. in. per 24 hours at a temperature of 100 deg. F. and a relative humidity of 95 percent on the wet side. Through further research and improved methods of application these rates are being continually reduced.

Adhesive properties or tackiness of microcrystalline waxes make them valuable as laminating agents when the adhesive layer also serves as a water-vapor barrier. Many of the ordnance wrapping materials now used employ this property of microcrystalline waxes.

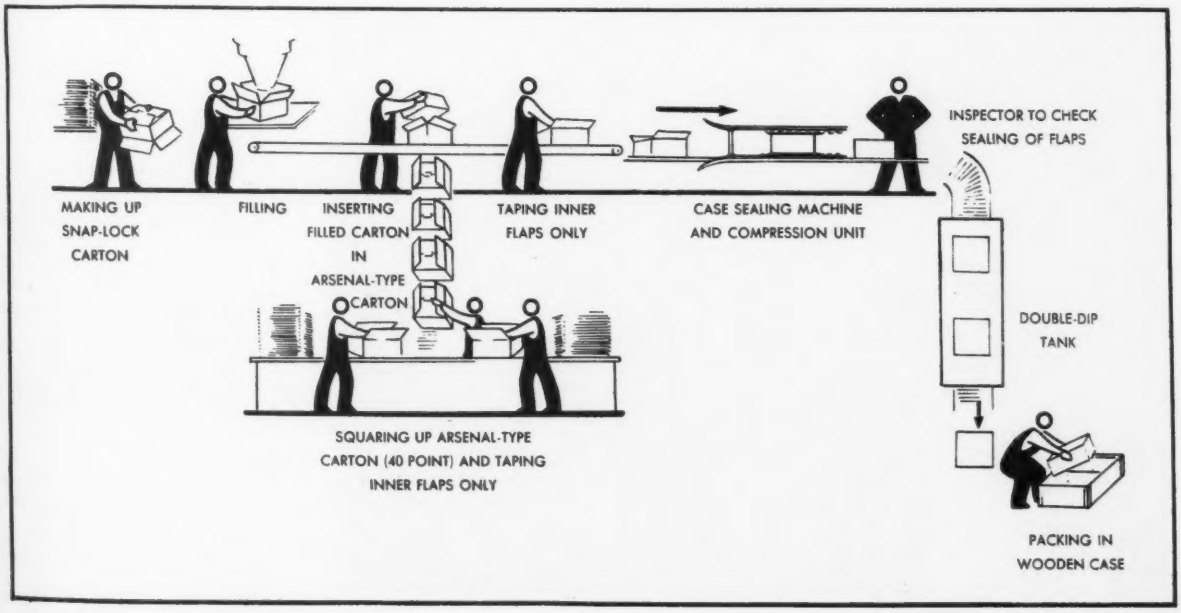
Paraffin-type waxes and microscrystalline-types may be combined with one another in all proportions, so that compromises in the form of blends are possible. This is fortunate today, when Army Ordnance and the Quartermaster Corps are demanding the lion's share of microcrystalline for the laminations and wax dips used for packing ammunition, metal parts and rations. The Quartermaster Corps has been using a combination of paraffin and microcrystalline for the wax dipping of ration packages, but is at present making tests of new wax compounds with less microcrystalline and including paraffins mixed with synthetic thermoplastic compounds. Future progress will undoubtedly be made in this field. Microcrystallines have been advantageous for military packaging because of their higher melting

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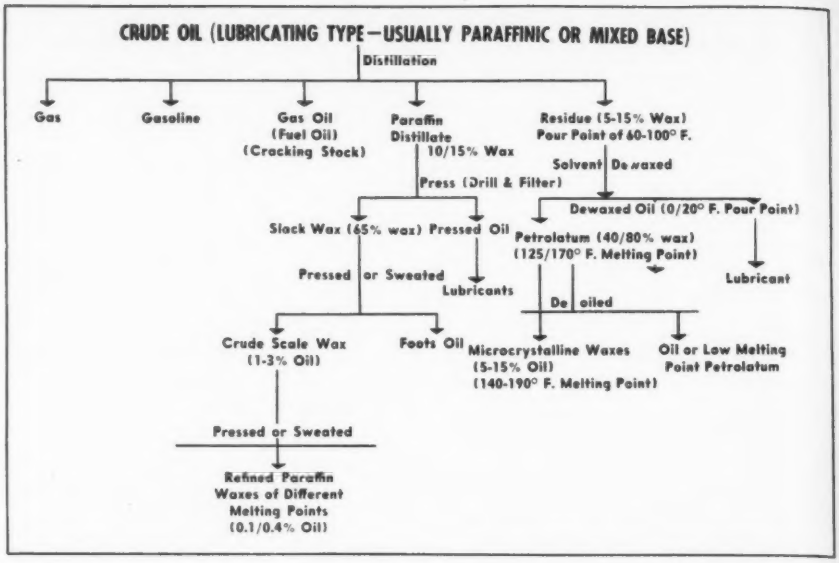


4. Paper may be made watertight by filling up openings between fibres with wax. This is known as dry waxing. This method does not completely cover the fibres and many protrude like wicks, which absorb moisture. A moistureproof sheet may be made by wet waxing, or applying the wax as a surface coating. A third method of imparting moistureproofness to a sheet may be done by laminating two plies of paper together with a layer of wax. 5. Diagram showing method of waterproofing packages now widely used for many overseas military shipments.

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6. This chart, in a simplified manner, shows the derivation of petroleum waxes from crude oil. Paraffins are a different branch of the family from microcrystalline waxes.

points, and because of their greater ductility which prevents chipping at low temperatures.

Petroleum waxes in themselves do not provide greaseproofness. Greaseproof properties are a function of the sheet and not of the wax treatment. Glassines, parchments, cellophanes, for example, are greaseproof in themselves, before the application of wax and not because they are waxed.

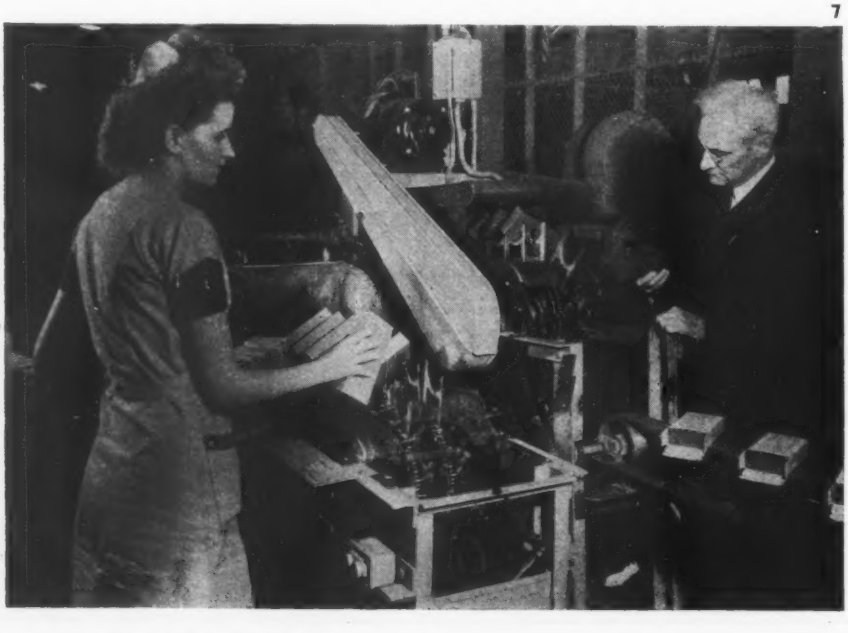
Blocking is a term used by the paper-converting trade to describe the condition wherein two waxed surfaces have flowed together to produce a union between them. Various degrees of blocking are experienced from the incipient fusion in which only the surfaces are marred slightly to the condition in which a cake or block of wax results. Blocking is caused by excessive temperature, time or pressure, either alone or in combination with one another. Blends of paraffin waxes and microcrystalline waxes, it is said, can be prepared which have no more blocking tendencies than fully refined wax.

Total American production of paraffin-type waxes today is between 350,000,000 and 400,000,000 lbs. annually. Eighty per cent of this is used for packaging purposes. Microcrystalline production today is about 100,000,000 lbs. a year, a six-fold increase since the beginning of the war.

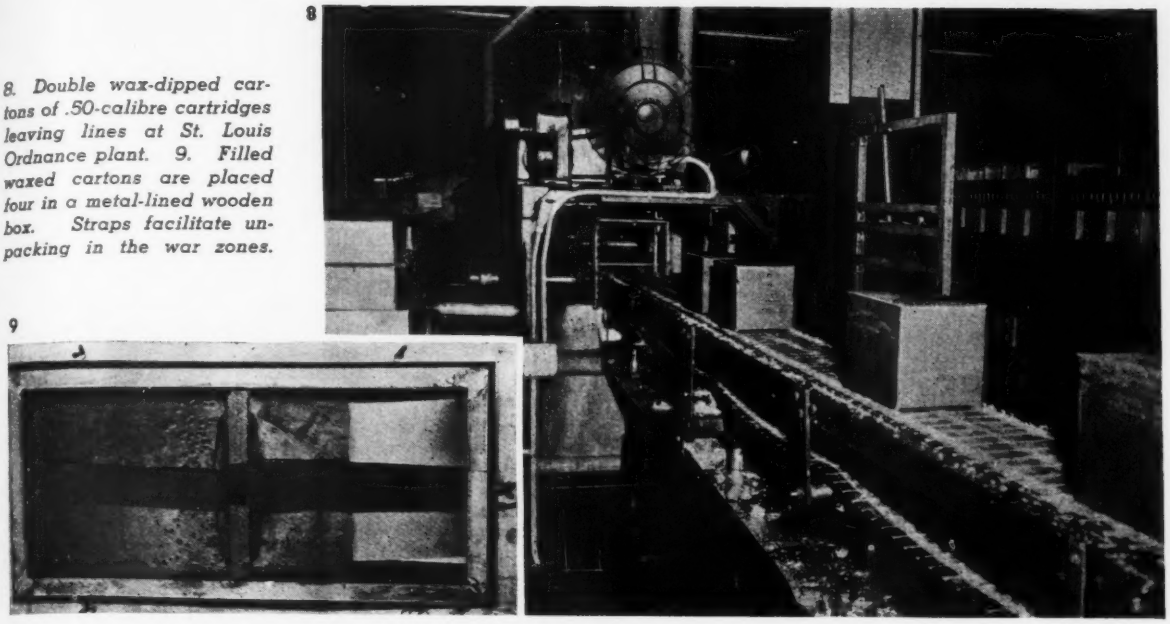
Wax may be applied to paper in the following ways:

1. As an emulsion in the beaters at the paper mill.
2. As a coating to paper or paperboard, on one or both sides, by roller method.
3. Immersion of entire paper sheet or board in a wax bath.
4. Dacca Method. Cartons of properly selected stock may be glued on one end then immersed in a molten wax compound which coats both inside

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7. Wax waterproofing machine used on Ration K-line at General Foods plant. Method is an enrobing action to give desired penetration. Packages are drained in an angular position to eliminate accumulation of wax on edges. Right: F. L. Bryant, chief engineer, responsible for installing this equipment.



8. Double wax-dipped cartons of .50-calibre cartridges leaving lines at St. Louis Ordnance plant. 9. Filled waxed cartons are placed four in a metal-lined wooden box. Straps facilitate unpacking in the war zones.

and outside of the container. The container is then dried in a hot chamber to give a thin uniform coating and finally may be heat sealed.

5. Single-dip Method. Sealed and filled carton is immersed in a molten bath. Extreme care must be taken to have container completely sealed before immersion, so that no wax flows into filled package.
6. Application by flushing-type machines such as the "enrober" or some milk-container coating machines.
7. Double-dip Method. Properly filled and sealed container is given a first dip to impregnate the board to a controlled distance, then is followed by a second dip to give a smooth, hard, continuous coating. Same compound is used for both dips, but is kept at a higher temperature for a shorter time during the first operation and at a lower temperature for the second dip. Machines for this operation are being widely used for wax dipping many types of rations and ordnance materials.
8. Lamination of two films with a wax adhesive.

Paraffin waxes have been used for hundreds of purposes in the food field for many years. The newest wartime developments are, perhaps, the blends of microcrystalline-type waxes for dipping ration packages and for ordnance wrapping of metal replacement parts to prevent development of corrosion.

The double-wax dip method used so widely for ration K is also adopted for the packaging of California dried fruit for export, for the Army's now famous 10-in-1 rations (food for one man for 10 days or for 10 men for one day). Just reported is the use of this same method for the packing of .50-calibre aircraft ammunition.

This method has been instituted at the St. Louis Ordnance Plant, operated by the United States Cartridge Co., a subsidiary of Western Cartridge Co. Experience of invasion forces show that, even in hermetically sealed metal-lined wooden boxes, water often penetrated when they were hurled from vessels into the water. This was especially true in invasion operations on South Pacific islands.

Under the new process, .50-calibre cartridges are packed 60 to a container, four containers making up the load in the wooden box which is shipped. After the ammunition-filled metal link belt is loaded into the individual, heavy paper container, the top of the box is sealed automatically. Then it passes along a conveyor where the box is inspected for breaks. After inspection, the container gets its first bath in molten wax which is heated to 200 degrees. A few seconds later it is immersed again, this time in a 188-degree bath. After the second immersion, khaki belts are placed around the individual containers. These straps are used in unpacking, since the containers are packed so tightly in the metal-lined wooden box that it would be impossible to remove them without damaging the containers.

The double-dip wax application for this ordnance wrap is the same in principle as that being used at American Chicle Co. and other places for the wrapping of the 10-in-1 rations. Cartons for this equipment may be made on standard folding box equipment. Paperboard employed must be carefully chosen. In addition to sufficient strength it must be finished in such a manner that the wax of the first bath will penetrate from 40 to 60 per cent of the board. Cartons must be securely sealed so that no wax enters the package and so that there is no chance of the wax film being broken at the edge of the tabs. Ends must be designed so that it is possible to obtain and maintain a continuous film of wax. Corners must be carefully matched to leave no holes over which the wax film is forced to "bridge" itself. Wax film is in

itself structurally weak and requires the unbroken support of the paperboard beneath it.

Packages are taken off the line at regular intervals, say one in every thousand, and tested for their ability to stand up under prolonged storage conditions, rough handling and submersion. In these tests they are subjected to 140 deg. above zero for 24 hours, 60 degrees below zero for 24 hours, drop tests and submersion for 24 hours under a 6-in. head of water.

Another development in a wax-waterproofing machine used on the K-ration packing line at the Franklin Baker plant of General Foods, Hoboken, N. J., is described as follows by F. L. Bryant, chief engineer, under whose supervision the installation was made:

> There were a number of methods proposed for wax impregnating and coating of the various ration packs supplied to the Army, but our experience in 1942 led us to the conclusion that the packages should be drained in an angular position so that the residual wax would flow to one corner and thereby eliminate the accumulation of wax which occurs when the packages are drained to an edge.
>
> "The method of wax application was studied and an enrobing" action gave the desired penetration on the first pass with three sets of nozzles and the proper film thickness on the second pass with two sets of nozzles. In both the first and second pass the packages are carried on specially designed carriers that hold the packages so they will drain off at one corner and the nozzles are arranged so that they flood from all four sides, thus insuring complete coverage.
>
> The machines are equipped with Viking pumps of 55 G.P.M. capacity, the excess wax draining back to a sump tank under the machine where it is strained before passing to the pump suction for recirculation. This sump tank is equipped with an automatic temperature regulator and recorder.
>
> This whole arrangement makes possible very close control of wax temperature necessary for proper penetration and coating.*

Wax coatings on metal

In addition to their uses for waterproofing and moisture-proofing all types of papers and paperboard containers including fibre cans with metal ends, petroleum waxes have also been used for coatings on metal. The prewar beer can, for example, had a petroleum wax lining. Since tin became scarce there has also been much discussion of wax coatings for collapsible tubes.

Lead is the only substitute for tin in collapsible tubes at present. Obviously it is essential that contents of collapsible tubes be protected from lead exposure. Most dentifrices will absorb some lead from contact with this metal and lather shaving creams absorb a considerable quantity of lead. Most products with an aqueous base will absorb lead when packaged in bare lead tubes.

It is necessary then to find an internal protective coating for collapsible tubes containing lead. Such a coating must be non-critical in supply, easily and rapidly applied, uniform, inexpensive, non-toxic, odorless, chemically inert, insoluble in water, have melting point above usual storage temperatures, flexibility and good adhesion to lead surfaces.

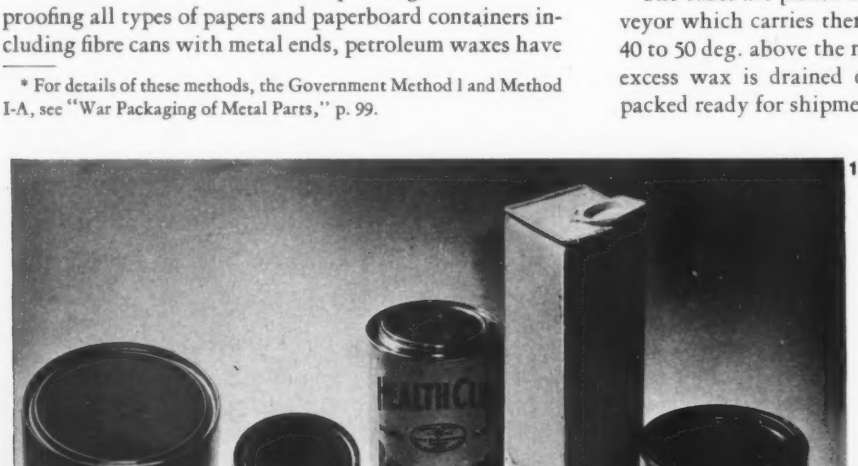
Tube makers differ in their belief in the efficacy of wax coatings for tubes. One company states that after six years of experiment they have no general statement to make because wax compounds differ so widely for various products, as well as equipment used for this purpose by various manufacturers.

Another maker has had some success with microcrystalline base waxes melting at 155 to 190 deg. F. Some of these waxes modified with synthetics have been used.

Waxes are applied as a final operation in tube manufacture. The tube is placed over a vertical mandrel having an actuating pin on the top. When the tube is pressed down on the pin, hot wax from a pot beneath the mandrel is pumped out through the top of the mandrel, flushing the tube. This cleans and coats the interior of the tube simultaneously.

The tubes are placed on fluted cones attached to a conveyor which carries them through an oven heated about 40 to 50 deg. above the melting point of the wax. Thus excess wax is drained off. The waxed tubes are then packed ready for shipment.

* For details of these methods, the Government Method I and Method I-A, see "War Packaging of Metal Parts," p. 99.



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10. Types of waxed-treated paper cans. Honey can is sprayed after fabrication with hot, high-melting microcrystalline. Sani-Flush and tobacco cans are sprayed inside after fabrication with paraffin and plasticizer. Microcrystalline was combined before fabrication in duplexing paper used in winding body of baking powder can. Milk container is immersed in fully refined paraffin after fabrication of the carton.

XUM

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11. A representative collection of wax-treated packages. Bread wrappers and paper milk containers are among the most common examples. Lard cartons, paraffin-waxed outside to repel water and prevent stains, have liner of greaseproof paper. Both carton and top are delivered knocked down. Many waxed packages are replacing metal.

New developments in waxing collapsible tubes have been largely confined to using substitutes for the particular microcrystalline waxes. However, Government demands on these have made them scarce and more attention is being paid to improve the quality of other possible coatings.

Nearly all dentifrices and lather shaving creams have been packaged in waxed-line collapsible tubes since the WPB tin order went into effect. Some cosmetic and pharmaceutical preparations have also been packaged in wax-lined tubes. A comparison of lead absorbed by the contents of unwaxed and wax-lined collapsible tubes published in the *Journal of the American Pharmaceutical Assn.* (Vol. 32, 1943) showed a significantly lower absorption of lead in the wax-coated tubes.

Postwar uses of waxes for tube linings, most authorities feel, will depend on the availability of metals for tubes. Some believe there will be little relief in the tin situation for quite some time, even if the war ends. If this is true, then this may be an additional packaging use for microcrystalline wax.

Thermoplastic coatings

Much is being said these days about thermoplastic coatings. Basically these are made from blends of various waxes which are combined in various ways with non-waxy materials to produce a strong, tough film-forming product resistant to the passage of moisture. Makers say true thermoplastic coatings are a homogenous product throughout the operating range of their use and they do not separate, stratify or throw out in the melting tanks. In these characteristics, they are said to differ from blends of waxes that do separate, stratify or throw out some of the added ingredients. They rely on a fibre or other base for their structural strength. They vary from hard non-blocking films to soft permanently plastic films. Most are sealable with heat and pressure. For foodstuffs they are odorless, tasteless and non-toxic. Their melting point varies, depending upon the tasks they are to perform. Application may be made by substantially the same methods as are used for applying other wax coatings.

These thermoplastic synthetic compounds used with paraffin are being used widely for many packages to take the place of microcrystallines. They have been used on jungle rations, mountain rations, the 15-in-1 and 10-in-1 rations. They are used on ordnance packaging for small arms. They are protecting such hygroscopic products as powdered eggs. Before the war thermoplastic coatings were adopted by Quaker Oats for their small individual pack and by Standard Brands for Diamalt, Honor Brands for frozen foods. New uses are for Friend's baked beans, A. A. Walter Co. dehydrated soup.

Cellophane cheese wrappers to take the place of foil have been successfully moistureproofed by these thermoplastic compounds. They may be used as a laminating adhesive.

Laboratory tests showed that boxes made from patent-coated-news stock, coated either outside only or inside-outside, provided moisture-vapor resistance in the finished package under 0.10 gram per 100 sq. in. per 24 hours at 100 deg. F. and 90 per cent relative humidity using anhydrous calcium chloride as a pack.

Petroleum waxes are among the oldest materials for imparting water and water-vapor penetration to packages. As packaging became more complex and required higher levels of protection, appearance and quality, the petroleum industry kept pace with its research and with production.

This program has been in two directions: first, in improving the commercial grade of wax and finding new grades and mixtures for special purposes; second, in finding material from other industries to combine with waxes to impart unusual properties of strength, film forming and water-vapor transmission.

Future progress will unquestionably be made in the second direction. Chemical research as exemplified by the plastics industry will produce many new synthetics.

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Applying thermoplastic coatings

by Robert J. Gray

The development of the unit package, particularly for such moisture-sensitive products as ready-prepared foods, dehydrated eggs, coffee and milk, has called for constantly improved protective materials. Waxed papers were followed by moistureproofed cellophane and pliofilm. Simple cartons were replaced by inner-bag cartons plus one or more outer wraps. Multiwall paper bags, or combinations of laminated papers with metals and other moisture-resistant films, have also been employed in the fight to keep moisture out or to keep it in.

Contrary to general belief, this search for improved moisture-resistant coatings is not a war baby, but the culmination of a prewar development which became complicated by a scarcity of raw materials, necessitating development of new materials to do the work.

Thermoplastic coating materials

These new protective materials are the outgrowth of earlier wax coatings, but they are new kinds of products, differing in many respects from their antecedents. Called thermoplastic coating materials, they are solutions of blends of selected waxes with high polymeric, non-waxy material of complex molecular structure which inhibit crystal formation and favor continuity of film which results in impermeability to the passage of moisture vapor. These materials are homogeneous throughout the operating range of their use and do not separate, stratify, or throw out in the melt tank. Their films are tough and continuous, and can vary from a hard, non-blocking coating to a soft, permanently plastic material used for combining. Perhaps the greatest advantage of thermoplastic coatings is their controlled viscosity over a wide temperature range, as compared with the wide viscosity variations within narrow temperature range of normal waxes or blends. This controlled viscosity gives a more foolproof material from the operating point of view and yields uniform coatings.

Since we can build new materials with predetermined characteristics, thermoplastic coating materials are now designed to do specific types of jobs, tailor-made, if you will, to the need. One manufacturer divides his products into five general classifications:

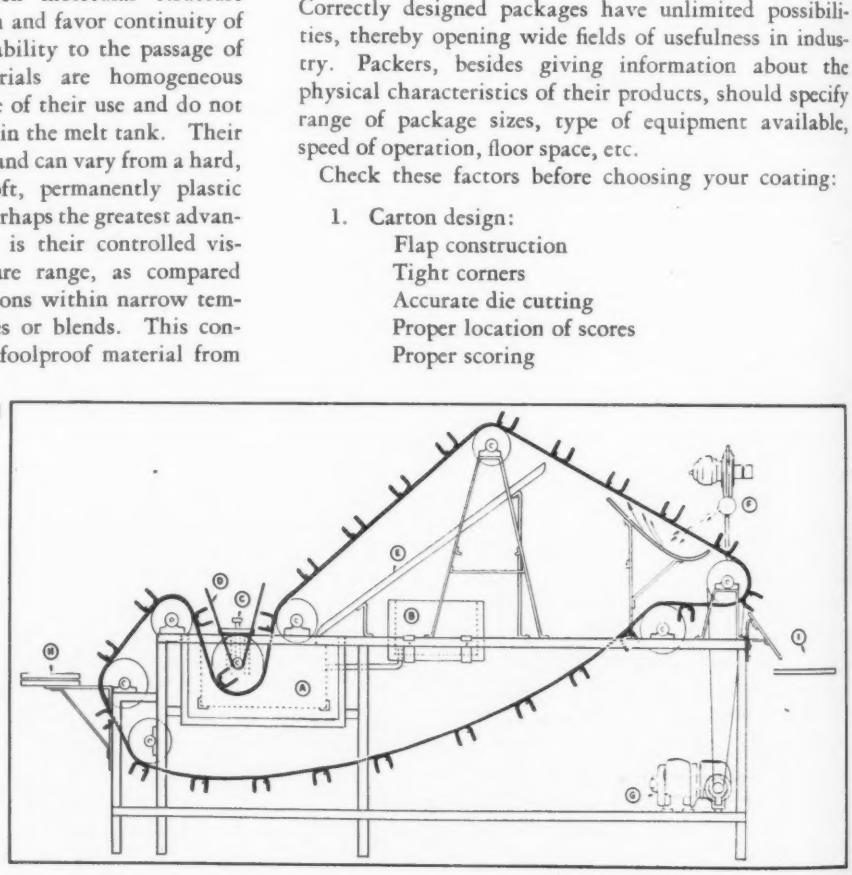
1. Dipping materials for the outside or inside-outside coating of finished containers made of fibre.
2. Coating materials to supply moisture-vapor resistance to sheet materials and to yield heat-sealing films.
3. Laminating adhesives for sheet materials, laminated either to each other or to carton stock, where moisture-vapor resistance is necessary. These resist flow, squeeze, and ply separation during heat sealing.
4. Coating materials for metal tubes.
5. Solvent solutions and dispersions for spray application or dipping where thin films are desired.

This concept of building specific materials to do specific jobs has resulted in a closer coöperation between cartonmaker, thermoplastic-coating supplier and packer. Correctly designed packages have unlimited possibilities, thereby opening wide fields of usefulness in industry. Packers, besides giving information about the physical characteristics of their products, should specify range of package sizes, type of equipment available, speed of operation, floor space, etc.

Check these factors before choosing your coating:

1. Carton design:
   - Flap construction
   - Tight corners
   - Accurate die cutting
   - Proper location of scores
   - Proper scoring

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1. Tank for single-dip thermoplastic coatings: (a) dip tank with steel jacket for steam heating; (b) pre-melt tank connected to dip tank through constant-level, float-control valve; (c) adjustable bearings vary immersion time; (d) baffle rods to keep packages submerged as they pass through dipping vat; (e) heated drip pan; (h) loading conveyor belt; (i) discharge conveyor belt.

2. Type and calibre of board stock
3. Finish of carton stock
4. Sizing of carton stock
5. Type of packaging equipment to be used
6. Type of filling equipment to be used
   Will it tear carton?
7. Forming facilities for carton
8. Sealing facilities for carton
9. Shape and size of mandrels
10. Adjustment of adhesive applicator
11. Adjustment of compression belts
12. Type of coatings to be applied:
    Single dip
    Double dip
    Inside-outside (Dacca) dip
13. Estimated production speed
14. Floor space available

Importance of proper sealing

Of equal importance with package design, paper stock and thermoplastic coating selection are the adhesive and the care used in sealing the filled cartons. No coating material has a chance of success with sloppy seals. A few pennies saved in cheap adhesives may prove an expensive economy. Care both in application and compression-belt adjustment are of paramount importance, for a poorly sealed carton cannot be "plugged up" tight with even the best of thermoplastic coating.

Methods of application

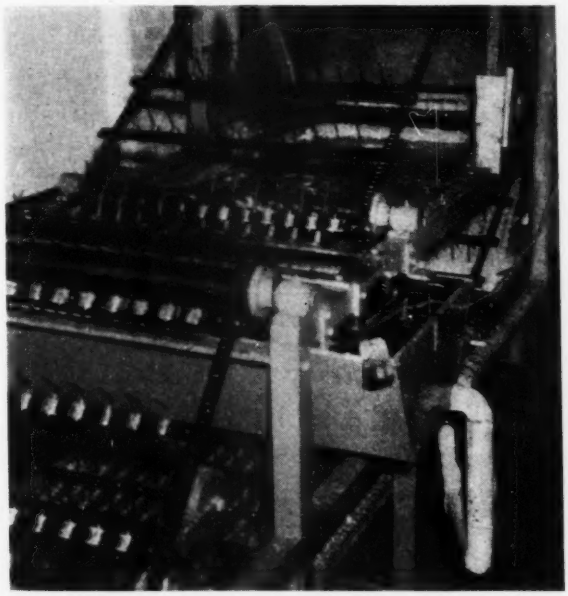
Having determined the correct package design, the carton stock and the thermoplastic coating characteristics, the type and size of applying machine depend largely upon the size of the package and the number of packages wanted per day.

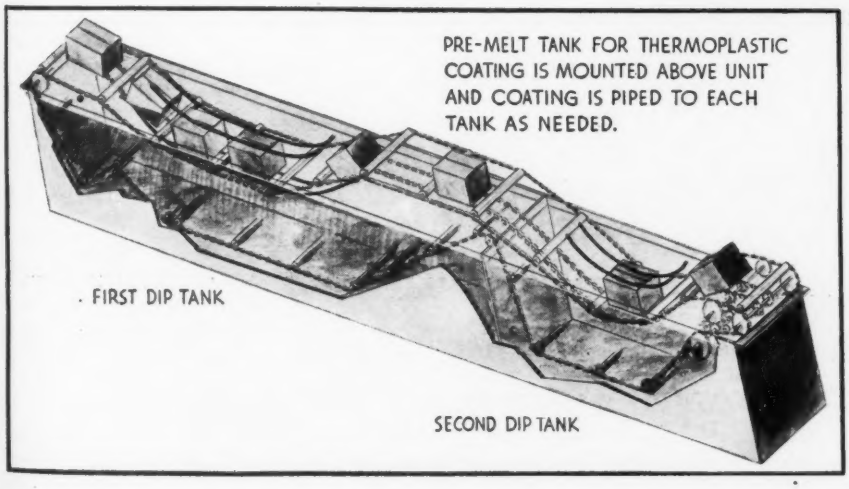
There are available single-dip machines for packages from 10 cu. in. to 200 cu. in. Here the filled and sealed carton is placed in a continuous-link belt conveyor, completely immersed in a bath of molten thermoplastic coating material, and cooled for about one minute before inspection and final packaging in shipping containers. Such a set-up is diagrammatically illustrated as Fig. 1. On a machine with 6 to 8 packages per link, a production of about 6000 to 7500 units an hour is a reasonable figure.

The double-dip method of coating has largely been used on shipping cartons up to 850 cu. in. in size. They are the "arsenal-type" carton made of 40-point jute or double-kraft-lined chip correctly scored and cut. After the carton is set up, the package is loaded, the inner flaps bent over and a small piece of gummed tape about 4 in. long placed over the joint of the flaps at the spot where the crossing of the inner and outer flaps leaves a pinhole. The carton is then properly squared up and sealed in a suitable automatic gluing and sealing unit. The flaps are held down by compression belts for about $1^1/_2$ minutes. The package is then inspected and sent through a double-dip machine.

The first dip is of about 15 seconds' duration in a bath of molten thermoplastic coating at approximately 200 deg. F. This allows a penetration of about 40 per cent of the carton stock and gives an anchorage for the coating. The dipped carton is then immersed for 4 to

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2. Carton-dipping machine, for outside dip only. Capacity is 120 packages per minute. Only one operator is required to load. Delivery conveyor belt is in foreground. 3. Diagrammatic drawing of double-dip tank.

6 seconds in the second dip tank, which is held at 165 to 175 deg. F. depending upon the board stock and speed of machine. When cooled, this gives a thin, continuous, uniform coating which is hard and non-blocking. The coating film has a high degree of tensile strength, high cohesion and firm anchorage. Since all fibres are covered, there is practically no wickage or seepage of moisture vapor into the package. Exhaustive tests have shown an extremely high resistance to insect infestation because the hard, smooth film and corners give no grip for even the most avid insect.

The Dacca method of applying thermoplastic coating consists of immersing a fully formed or set-up, yet unfilled carton, whose bottom flaps have been glued, into a molten bath of thermoplastic coating material, coating both inside and outside surfaces of the carton. The carton is inverted and drained in a hot chamber and then cooled to give a thin, uniform coating. After filling, the package is heat sealed, using either the coating material for sealing or through the use of secondary, booster thermoplastic adhesives applied to the flaps.

Several other types of machines, such as chocolate enrobers or milk-container dipping machines, are available for applying these thermoplastic coatings.

Resistance to moisture vapor

Resistance to moisture-vapor penetration as well as moisture itself depends entirely upon the design and care with which the container is made. However, with well-made production samples, repeated laboratory tests have shown that boxes made from patent coated news stock, coated either outside only or inside-outside, provided moisture-vapor resistance in the finished package under 0.10 gram per 100 sq. in. per 24 hours at 100 deg. F. and 90 per cent relative humidity, using anhydrous calcium chloride as a pack. Millions of ration packs containing such hygroscopic materials as dehydrated cocoa, milk, sugar, hard candies—for example, the famous Jungle rations—bear out these laboratory findings.

Packages using thermoplastic coatings

In addition to use on Army rations, thermoplastic-coated containers have been used for several years on such hygroscopic products as cereals, dry malt powders, powdered eggs, dehydrated beans, soups, etc. They have also been used to prevent dehydration of frozen vegetables and fruits. Whether the requirements are to keep moisture vapor out or prevent loss of moisture vapor, these new thermoplastic-coating materials have a wide range of application.

Comparison with other methods

Since the per pound cost of a coating material is meaningless, the comparison of manpower, materials and paper consumed (Fig. 4) is interesting. All figures are based on costs prevailing on November 17, 1943, and manpower on an average of several installations.

Coatings for sheet materials

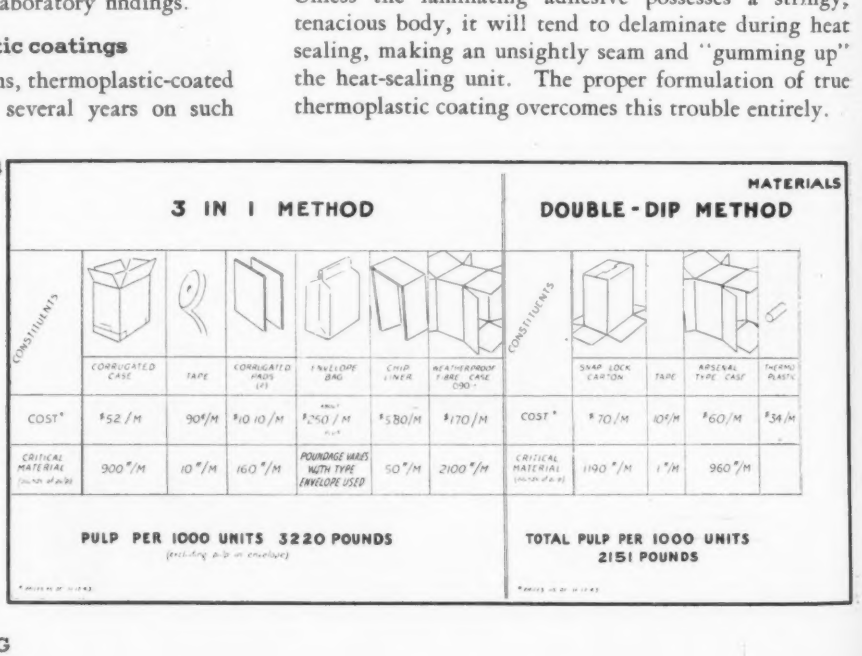
The controlled viscosity of these new thermoplastic coating materials over a wide temperature range is of particular advantage in coating sheet material. It permits the application of continuous films which, because of their cohesiveness, give both moisture-vapor protection and also permit heat sealing of packages made from the coated sheets. When applied to printed cellophane, it gives a superior product for holding packaged cheese. Coated paper stocks are used, for example, on hard candies, which are very hygroscopic.

Here also, the nature of the thermoplastic coating material can be varied to meet the nature of the job or the composition of the sheet material itself.

Thermoplastic laminating adhesives

The problem of laminating adhesives is one of building materials that are permanently plastic—yet which retain bond strength, cohesiveness and tack—to hold the plies together, while yielding an impervious, moisture-vapor protecting film. The cohesive strength of the thermoplastic coating is particularly important where the laminated material is made into bags and heat sealed. Unless the laminating adhesive possesses a stringy, tenacious body, it will tend to delaminate during heat sealing, making an unsightly seam and "gumming up" the heat-sealing unit. The proper formulation of true thermoplastic coating overcomes this trouble entirely.

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4. A chart which illustrates the comparative costs of the "3-in-one" coating method and of the double-dip method.

Lacquers—for protection & appearance

by Paul H. Yoder

In present-day usage, the word "lacquer" has come to mean any coating material which hardens or forms a film by the evaporation of the solvent vehicle.

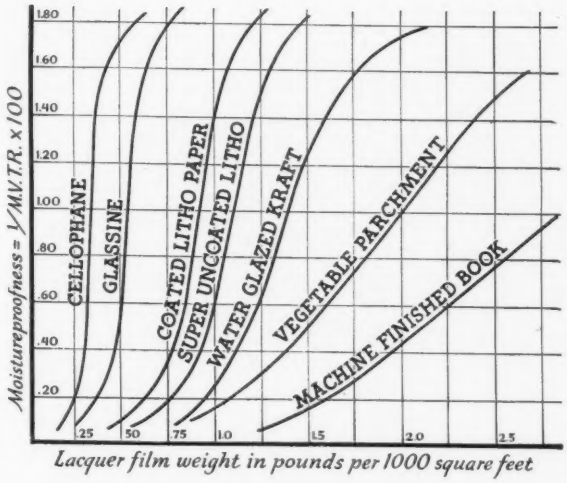
The number of ingredient materials entering into the formulation of modern lacquers is very large indeed. Lacquers, as used in packaging, are made from nitrocellulose, cellulose acetate, cellulose acetate butyrate, cellulose acetate propionate, cellulose ethers including the methyl ethyl, amyl and benzyl celluloses. Besides cellulosic film formers, lacquers are made from resins such as vinyl acetate, vinyl acetate-chloride copolymers, alkyd resins, acrylic polymers and the like. Important lacquers are made also from derivatives of rubber and balata, such as chlorinated and cyclized rubbers.

These film-forming materials are sometimes used alone, but more frequently with each other in varying proportions along with non-film-forming modifying agents. Among the many modifying agents are the classes of substances called plasticizers, soaps, waxes, drying and non-drying oils.

Lacquers are applied in packaging to a wide variety of base materials ranging from such very dense, smooth surfaces as cellophane, foil and glassine, through the countless grades of finished, coated and calendered papers, down to such definitely porous materials as cloth, kraft, chip board and papier-mâché. In general, the problem of forming a continuous and functionally useful film increases in difficulty as the base material is more porous and less dense.

This important relationship between lacquer and kind of surface can be demonstrated by applying an identical coat of a gloss lacquer to a number of different kinds of paper. In this particular case, the desired property of the lacquered paper was gloss. Before lacquering, the different sheets were measured by means of the Hunter-Gardner gloss meter to determine their uncoated glossiness. All of the surfaces were then coated simultaneously with a clear glossy lacquer and the resulting lustre was again measured with the gloss meter.

Kind of paper	*Gloss before lacquering in mil (Gardner)*	*Gloss after lacquer in mil (Gardner)*
Blotting paper	18	21
Machine-finished duplex litho—60 lb.	19	54
Machine-finished kraft—70 lb.	21	33
Offset bond	22	51
Vulcanized fibre	23	73
Vegetable parchment—30 lb.	28	66
Water-finished calendered kraft—50 lb.	32	75
Sufered manila—8 point	38	86
Coated one side litho—55 lb.	39	112
Glassine—26 lb.	84	136
Chromium burnished label—60 lb.	88	109
Polished black gloss panel standard for instrument	95	...



1. Table showing relationship between base surface and lacquer coating for moistureproof protective packaging.

It may be seen from the gloss figures in the table that if the production of glossy Pyroxylin lacquered fancy box wrap paper is contemplated, the selection of the base paper is of the utmost importance.

The same kind of relationship exists between the base surface and the lacquer in the coating of components used in moistureproof packaging. In Table 1 there has been plotted "Moistureproofness" (i.e., the reciprocal of the observed moisture-vapor permeability) of various types of paper as the result of applying various film weights of a moistureproof nitrocellulose lacquer. One axis shows increasing film weight of lacquer up to and beyond 2 lbs. per 1,000 sq. ft. and the other axis shows increasing moistureproofness. Observe that for a film application weight of 1-lb. film per 1,000 sq. ft., the moistureproofness of the lacquered cellophane and glassine is roughly ten times that of lacquered, water-finished kraft paper and four times that of supercalendered label paper. The data show further that if a good moistureproofness is required, a porous paper such as M. F. book should not be used, since surface coatings in any practical film weight will not yield the desired result.*

The purpose of applying lacquer to such dense, nonporous surfaces as cellophane, glassine, parchment and mechanical greaseproof papers is to accomplish one or more of these purposes, i.e., to make such papers moistureproof, heat sealable or water resistant.

Lacquered, transparent foils, such as cellophane, are

* Water-emulsion lacquers are used on porous papers with success. These non-penetrating coatings are capable of closing porous surface, but their usefulness is somewhat circumscribed by the distortion set up in the paper by the water content of the emulsion.

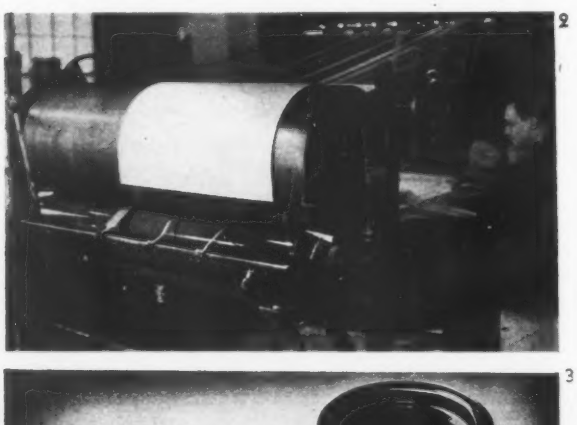
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well known and widely used for packaging innumerable commodities, either in bag form, as an inner or outer loose wrap, or as a laminated structure. Similarly lacquered glassine, which is usually coated on both sides with a heat-sealing moisture-vapor-resistant lacquer is widely used in bags or as wrappers. In general, both lacquered cellophane and glassine may be printed by rotogravure or aniline press. The types of lacquer used on cellophane to produce the several grades available for packaging are usually nitrocellulose base materials. Similarly on glassine, the coatings are usually of the nitrocellulose, chlorinated or cyclicized rubber type and the procedure in the case of both cellophane and glassine is to apply lacquer to webs rather than sheets.

On the more fibrous materials such as label and book papers, lacquers are used for both their functional and decorative qualities. Functional lacquers generally are decorative but relatively few decorative lacquers are more than waterproof. Functional lacquers are usually applied over the printed paper, in order to produce a moisture-vapor-resistant label or wrapper for a fibre can, as a heat-sealing coating for loose wraps or bags, for producing a moisture-resistant loose wrap for cartons, or as a heat-sealing coating for labels and bands.

In so far as the application of lacquer for decorative uses is concerned, the paper usually used is a coated litho stock or supercalendered label stock. As the name indicates, nitrocellulose type lacquers are most frequently used to produce the so-called "Pyroxylin Coated" papers.

2. Applying lacquer by sheet-feed. Strips on roller leave unlacquered spaces for glue laps of labels. 3. Paper can, lacquer coated (left) replaces metal container for hygroscopic products. Photos Pyroxylin Products, Inc.



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Pigments or metallic powders are frequently incorporated into such lacquer to produce beautiful and novel effects. The resulting lacquered papers are used for laminating or pasting to boxboard for set-up boxes, as well as for wrappers for gifts and other fancy packages, and as liner sheets for fancy boxes. Packages wrapped in such papers may, if soiled during shelf life, easily be cleaned by wiping with a damp cloth.

Although nitrocellulose lacquers are most frequently used for the decorative types of lacquer, other film-forming materials such as vinyl resin lacquers, ethyl cellulose, cellulose acetate and vegetable (corn and soy) protein compositions are being used increasingly as decorative coatings. Certain lacquers made from cellulose ethers and the vinyl copolymer resins, when handled by special techniques, are capable of producing a finished product equal in gloss, flexibility and greaseproofness to that obtained by laminating paper with transparent foils such as cellophane or cellulose acetate.

Lacquers may also be applied to boxboard for both decorative and functional effects. The board, usually patent- or clay-coated folding boxboard, is printed before lacquering. Year after year, millions of cartons—particularly for liquor, cosmetics and pharmaceuticals—are lacquered to enhance their eye appeal and promote shelf-life cleanliness.

Certain war uses have been found for lacquered kraft paper in the packaging of spare parts for mechanical and ordnance equipment. The lacquers so used must be grease resistant and for some applications must also be heat sealing. In this field, vinyl copolymer, vegetable protein and cellulose acetate butyrate lacquers are the predominant types used.

Lacquers for packages, other than paper packages, are being exploited to an ever-increasing extent. The external lacquering of tin cans to prevent corrosion during shipment and storage in tropical areas has been established on a large scale. These coatings are applied either by spraying or dipping, and have been pigmented to camouflage colors to blend with the landscape so that the gleam of the cans does not disclose to aerial observers the presence of a food cache. The critical tin shortage has also created a problem in the manufacture of collapsible tubes for cosmetics, pharmaceuticals and the like. Lacquers of various types have been devised to line lead-alloy tubes to prevent the contents from becoming contaminated with toxic metallic lead. Aluminum and lead-alloy foils are coated with special lacquers to provide heat-sealable foil. Similarly, dyed lacquers are applied on the exterior surface of metal foils to enhance the beauty of the metallic reflection and to produce a brilliantly colored, eye-catching packaging material. For application to metal foils lacquers are predominantly formulated from either nitrocellulose or from vinyl derivatives.

Heat-sealing principles

by F. S. Leinbach

Heat-sealing agents, for the purposes of this discussion, are thermoplastic materials which can be formed into films or can be coated upon papers or other films and are reasonably normal, non-sticky solids at ordinary temperatures; but which either melt or become very sticky at temperatures ranging from about 150 deg. F. to about 300 deg. F. If two pieces of such an agent are pressed against one another and if the area of their contact ("interface") is raised to the temperature at which the material either melts or gets very sticky, the two pieces will weld together (i.e., be "sealed" by heat). If the same agent is coated over the surface of, for instance, paper, in sufficient thickness, two layers of that coated paper, if pressed together and heated, will be "sealed" by action of the heat-sealing agent comprising the coating.

Types of agents

Heat-sealing agents are of two types: (1) those which are coated upon some carrier film or sheet and (2) those which can be made into films by themselves. Of course, some materials can operate in both categories.

The heat-sealing agents which are coated upon carrier films or sheets, in turn, are of two types: (a) those which truly melt and (b) those which, on heating, become very sticky. This latter type generally are materials that decompose before they get hot enough to melt.

Paraffin wax is typical of the agents which are coated upon a film or sheet and which truly melt. Waxed paper, still the most widely used heat-sealing material, was the earliest product to bring the advantages of heat sealing to packaging. Paraffin wax is not particularly sticky at ordinary temperatures, but melts at somewhat elevated temperatures, ranging from about 130 deg. F. to about 140 deg. F., depending upon the grade of wax used. If two pieces of waxed paper are pressed together and are sufficiently heated through to their interface, the paraffin on their surfaces will melt and fuse. While molten, the wax is not sticky, hence will not hold the two sheets together, but if they are held in position until the fused wax in the interface chills, the wax will have sealed the two sheets together. It is characteristic of most true melting agents that their seals must be held in position while the sealing material solidifies.

The force required to separate the two pieces of sealed waxed paper, that is, the tightness of the seal, is easily seen to depend upon the cohesion of the wax with itself and the adhesion of the wax to the paper. It is common experience that neither the cohesion of paraffin nor its adhesion to paper is very great; therefore, the tightness of the seal, or the seal strength of waxed papers, is not very great, although obviously adequate for many purposes. It should be noted that within limits, the seal strength of waxed paper increases with an increase of the thickness of the waxed coating. It should also be noted that until a certain thickness of wax is coated on the surface of paper, it does not become heat sealing. If, under the heat of the seal, too much of the wax is absorbed into the paper or among its surface irregularities, too little remains on the surface to effect a seal.

In order to improve the seal strength of waxed papers, it is necessary to cause both the cohesion of the wax and its adhesion to its base sheet to be strengthened. This is done by adding materials like rubber, rubber derivatives or related compounds, or resins. Suitable materials of these types not only raise the melting point of the wax, but also make it become quite sticky when hot. In fact, blends of this type do not have a true melting *point*, but, as the temperature increases, they become sticky ("tacky") and softer until they finally do approach what might be termed a molten state, though never so fluid as molten wax. The relation between temperature increase and progressive softness is known as the "melting" or "softening" range of the blend. As indicated, such blends can be made to be quite tacky when hot and thus make quick and firm heat seals with a minimum of chilling required before the seal "sets." In some cases, at

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1. At right is a foil-covered carton which illustrates method of applying heat-sealing agents during the formation of the package. Paper-wrapped carton on left has agent applied to areas to be heat sealed at the time of wrapping.

sealing temperatures, the material of the coating is so tacky that no chill is required, for the tackiness of the material, though hot, is sufficient to hold the seal together. Blends of this type usually have excellent adhesion to many things and papers or films coated with fairly heavy coatings have found widespread application, such as in bags for wet pack frozen foods, in cheese wrappers, and in "heat-seal" labels, where the tackiness of the hot material coated on the back of the label is useful in adhering the label to almost anything including glass, the sealed ends of waxed bread wrapper, individual frankfurters, etc. As may have been noted, such modification of wax tends to direct it into the second type of agents that are coated upon a carrier sheet or film, namely, those which on heating do not melt, but become very sticky.

Most widespread among these latter agents are nitrocellulose lacquers. Nitrocellulose, by itself, is anything but heat sealing, but it does form cohesive coatings. Adhesion between the nitrocellulose and the carrier film or sheet is obtained through the addition of resins, which have, as a class, excellent adhesion. This blend is then softened with a "plasticizer" to a point where the softening range is such that the coating is not sticky at ordinary temperatures, but becomes so tacky at elevated temperatures that fusion may be had. Here, as with the paraffin or modified paraffin, the seal strength remains a function both of the cohesion of the coating and its adhesion to the base material. It is difficult to find that rare blend of nitrocellulose, resin and plasticizer which has the proper softening range; and the lacquer formulator is ever between the possibility of the coated material sealing to itself in rolls before use ("blocking"), or of not becoming sufficiently tacky at permissible temperatures to seal effectively. For these and other reasons, *all* heat-sealing packaging materials should be stored at moderate temperatures by the user, avoiding excessively warm storage.

The outstanding, widespread example of nitrocellulose heat-sealing coating is to be found in heat-sealing cellophane. As is commonly known, this product is made by applying a nicely blended nitrocellulosic heat-sealing coating to a film of regenerated cellulose. This coating has other functional advantages besides heat sealing.

There are a number of other agents which adapt themselves to heat-sealing coatings. Ethyl cellulose and its blends make coatings that heat seal excellently. Cyclized rubber coatings have a quick, firm heat seal. Cellulose acetate can be formulated for heat sealing. The vinyl polymers produce coatings that heat seal at fairly low temperatures. Vinylidene chloride polymer, also the mixed cellulose ethers and polyvinyl butyral, all produce excellent seals, but their fullest use is not nearly developed as yet because of production limitations imposed by war conditions. These agents vary in their cohesion and in their adhesion to base materials; therefore, the strength of the seals they make will vary.

Many heat-sealing agents are cohesive and strong enough to be cast into films, and thus do not need to be coated upon some carrier sheet or film, although some may also be used as coatings. An example of heat-sealing film material is well known in rubber-hydrochloride film, widely used before the necessary curtailment of rubber. Ethyl-cellulose film also was well known, though newer and with less widely extended uses. Cellulose acetate has been cast into films for packaging purposes for some time and has found extended use, particularly where greaseproofness is required.

Methods of application

Heat-sealing agents are directed to packaging use in four general methods: (1) as a self-supporting film, (2) as an over-all coating on a carrier sheet or film, (3) applied as a spot or strip only to those areas of a sheet or film that are the areas to be heat sealed in forming or closing the package (as around the mouth of a bag) and (4) applied to the areas to be heat sealed, but applied just as the package is in the process of formation.

In the case of the self-supporting film, the strength of the properly made seal is the strength of the material itself. A package made from a heat-seal film and having completely heat-sealed closure is literally encased in a continuous unbroken film of that material. The advantages of such an arrangement in terms of moisture-vaporproofness or the other functional qualities of the film are obvious.

In the case of the over-all coating, the same situation may be closely approached, even approximated with ideal seals, although the full functional efficiency of packages made from coated sheets or films is more likely to be impaired by less than perfect seals.

In both cases, however, considerable advantage in package formation accrues from the fact that any two areas of the films or coated papers, when placed in contact and heated, will form a seal. No regard need be paid to having exactly the right spot in the right position. These methods of directing heat-sealing agents into packaging work are the most widespread and enable the formation of wraps, bags, packages and package adjuncts of varied description.

Heat-sealing agents directed to packaging use through applying a spot or strip only to those areas to be heat sealed are finding increasing use, particularly in bag manufacture. Many materials that have most useful qualities, such as the greaseproofness of parchment, and the moisture-vaporproofness and greaseproofness of laminated glassine, do not happen to have the ability to heat seal. They can be augmented with a coating to lend heat-sealing characteristics, but if the coating does not have to contribute some other useful function, it is not economical to do so since the majority of the area covered by the coating never gets used in performing the heat-sealing function. In bag manufacture this problem is solved by applying an imprint of heat-sealing agent around the inside edge of the top of the bag, since this is the only area that needs to be in contact for heat-seal closure. In some application of foils, a thermoplastic material (i.e., heat-sealing agent) is "spotted" in strips along only those areas of the web which will be in contact when the seal is made.

The method of direct heat-sealing agents into packaging use by applying them to the areas to be sealed, but applying them as the package is in the process of formation, is peculiar to certain types of wrapping equipment which enables the advantages of heat sealing to be used on non-heat-sealing webs, just as in the previous method. In this case, however, the web is fed into the wrapping machine and as it is placed around the object to be wrapped, just before the areas to be sealed are brought into final contact, strips of heat-sealing agent (thermoplastic material) are placed on the proper areas, the closure is made and the seal insured by heating.

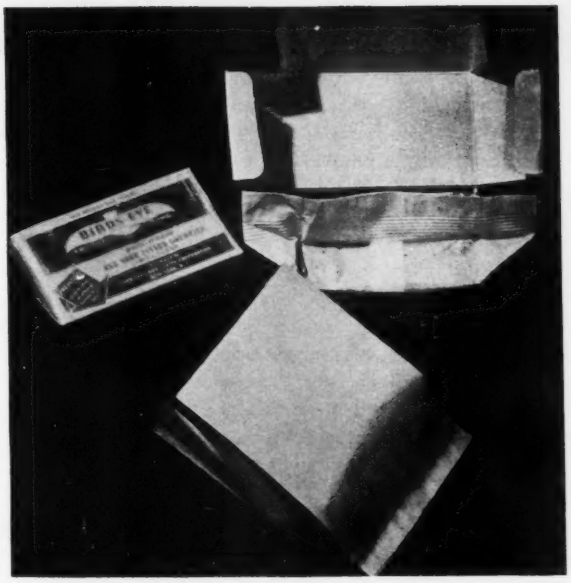
Heat-sealing materials

To inspect and evaluate, even elementarily, any heat-sealing packaging material, it is necessary to know the temperature required to effect the seal with that particular heat-sealing agent (which does not mean the temperature of sealers on machines that will handle the material, as will be discussed in a later article), the strength of the seal and whether or not the material is likely to block (stick together) during shipment prior to use.

The fusing temperature of any heat-sealing agent varies with the formulation of the material itself and must be determined for each agent and for any variation of it. A method for such determination has been to press two thicknesses of the material together between two heated metallic sealer surfaces with sufficient pressure to insure close and uniformly even contact, inspecting the tightness of the seal at progressively increased temperatures. For almost all materials an optimum temperature range will be found, below which or above which the seal is not so firm as it is if made at temperatures within the optimum range.

The material of the sealer surfaces should be non-reactive to materials such as resins having high acid numbers and should have good thermal conductivity. Copper suggests itself from both standpoints. The source of heat probably would best be electrical and should be of such shape and position as to insure even heat distribution across the sealer surface. The temperature might be measured by a surface pyrometer actually placed against the sealer surfaces, but maintained by close thermostatic control, in which case the thermostat bulb should be between the source of heat supply and the sealer surface. It may be possible to do this job through accurately calibrated thermostatic control alone. The sealing surfaces probably should be flat, since the same apparatus is essential to the ensuing test, and serrations might cause an uncontrollable variable in that test. The trouble with this, however, is that metal parts, however carefully manufactured, tend to warp even slightly under prolonged heating, and even slight variation of pressure alters the effectiveness of the seal. It is probable, therefore, that one of the sealer surfaces should be a heat-resistant resilient material, possibly one of the vulcanized synthetic rubber compounds. This suggests one sealer surface or block made of metal and containing the heat source, the other made of a resilient material, without a heat source. The force applied to make the seal should

2



2. Seal strength of this bag for frozen foods has been increased by blending the wax with suitable materials.

be sufficient to insure close contact throughout the sealed area. The time of contact should be long enough so that the entire sample is raised to the indicated temperatures, regardless of thickness or conductivity.

It must be remembered that in the case of coated materials there are many combinations where the seal is stronger than the base material, resulting in a "tear" seal, meaning that on separation of the seal the base material tears without causing the seal to fail. Thus, a strong sealing coating on a weak base material can give a tear seal, but on a stronger base material it may not cause a tear seal. It is the opinion of the writer, though not necessarily shared by various well-informed workers, that in any standardized seal strength test some means of correlating such performances must be worked out. It has been suggested, and it may be shown to be adequate, that in the case of the tear seal one should report the force that had to be exerted, with a notation that the seal was stronger than the base material.

TECHNIQUES

The effectiveness with which two or more layers of a particular heat-sealing material may be made to seal together depends upon three factors: (1) temperature used to furnish the heat; (2) the pressure with which the layers are held in contact; and (3) the time during which the hot contact is maintained. Each of these factors varies in reaction to the other two.

The temperature factors

A heat-sealable agent is heat sealing because there is some temperature at which it either melts or becomes fusible. The factor of temperature in heat sealing, therefore, is determined by the temperature at which fusion of the particular material can be accomplished, but it

should be noted that if an agent fuses at 200 deg. F. the sealing mechanism furnishing the heat may have to be much hotter than that, for it must drive enough heat through the intervening layers of sheet or film to raise the two surfaces in contact to the fusing temperature. How much hotter the sealing mechanism must be depends entirely upon the pressure with which the contact is maintained and particularly upon the time that is allowed for the heat to transfer. Furthermore, surface temperature of the sealing mechanism is only an indicator—the amount of heat its heater can furnish is the real determining element, because it must have sufficient capacity (wattage, in the case of electric heaters) to transfer heat enough to make seal after seal and still maintain the temperature differential required to cause the heat transfer capable of raising the inner surfaces to their fusing temperature. For the surface of a sealer to be quite hot at the start of a run is of no particular value. The heater must be strong enough to keep it up to the proper temperature throughout the run.

The pressure factor

Pressure of contact is important because under close contact the heat will transfer more uniformly, more thoroughly, more quickly, because the seal will be stronger with every point of the sealing area in close contact rather than apart in spots and because the temperature at which most heat-sealable materials will fuse generally decreases, within limits, with an increase of pressure. As is well known, some of the softer heat-sealing agents will seal at ordinary temperatures under sufficient pressure. Increased pressure, therefore, aids the ease, strength and thoroughness of a seal unless some extraneous factor, such as rupture of the carrier film, for example, is introduced.

The time factor

Time is a very important factor in heat-sealing technique and, as indicated above, is closely related to temperature. At any given temperature and pressure, enough time must elapse for sufficient heat to penetrate the intervening layers and cause fusion of the sealing surfaces. Increased temperature (properly caused by sufficient heat supply) and increased pressure will require less time. Thus, of the three basic factors in heat-sealing techniques—time, temperature and pressure—none of these factors operates independently for each is closely related to the other. Regarding this time-temperature-pressure relationship, it is also most important to note that there are limits affecting each of the three factors and their interrelationship. If the heat supply is increased, at a given pressure, the time can be decreased, but this relationship reaches a limit two ways. The first limit occurs when the time is so short that the sealing mechanism must become so hot that it burns the outer plies of the seal, yet never raises the inner sealing surfaces to the sealing temperature. This is one reason why certain materials are found to have a limit of operating speed regardless of heat supply in the sealing mechanism, for as the speed of sealing of the mechanism is increased, the time factor is decreased to a point at which the above-mentioned difficulty is encountered. This is fairly common and is most easily noted on fibrous base materials. This situation can be alleviated if the sealing or wrapping mechanism is equipped to apply to the sealing areas small amounts of a solvent which will partially dissolve or soften the heat-sealing agent. Under that heat which does reach the fusing surfaces, this solvent softens the coatings, enables them to fuse and then evaporates under whatever heat is there at the time or during subsequent time. Such aids to sealing are known as "solvent activators" and their composition must vary according to the composition of the heat-sealing materials they activate, for they must be of a type capable of dissolving that particular coating. They are so effective that the widest use is in enabling heat seal of materials that ordinarily are not heat sealing, such as the type of cellophane usually used for cigarette pack wrapping.

The second limit on the time portion of the time-temperature-pressure relationship is, as indicated above, the strength of the heat supply. It is most important to realize that the surface temperature of sealers at the start of a run means little. There must be sufficient heat supply to keep furnishing heat to seal after seal without cooling below the supposed or apparent surface temperature. One fallacy of inexperienced operators is to suppose that because a thermostat on the sealers of a high-speed machine has a marking for 500 deg. F., the mere setting of the device at that figure guarantees that temperature. Under some such instances it has been found that the current merely is allowed to flow all the time, that the heater is not strong enough during the run to hold the temperature above an actual 275 to 325 deg. F. and that, as a result, the thermostat never gets a chance to control the temperature. Obviously, for effective operation under this condition the time factor must be adjusted (machine slowed down) until it balances the heat-furnishing ability of the sealing mechanism.

Temperature sealing range

Regarding temperature, it must be realized that every heat-sealing agent has an optimum sealing range—a range of temperatures below which inadequate seals are obtained and above which the seal is not so tight as it could be made. This sets a limit upon the temperature portion of the time-temperature-pressure relationship. The effect of a solvent activator, used under difficult circumstances, is to broaden the optimum sealing temperature range of the heat-sealing agent. A further limit becomes apparent when it is realized that if the outer plies, or outer portions of plies adjacent to sealing surfaces, are made so hot that they remain above the sealing or fusing temperature of the heat-sealing agent, that agent remains soft, the seal is not self-supporting and it comes open. Some materials that actually melt, such as paraffin wax, and others which fuse at similarly low temperatures, always require a definite "chill," or cooling while the component plies of the seal are held in place. An example of this is found in the "take-away" belts on a bread wrapping machine handling waxed paper. Without the chance to solidify in position, the seals would all

come open. Materials that fuse at a higher temperature, such as heat-sealing cellophane, do not need that type of "chill," but they must not be made so hot that their heat cannot quickly transfer to surrounding areas or the seal will be less effective. Self-supporting, heat-sealing films, such as rubber hydrochloride, should not be made too hot, for the material will be pressed out too thin and what otherwise would be a weld of the entire material as strong as the film itself becomes the weak point.

The limitations upon the pressure portion of the time-temperature-pressure relationship are mainly mechanical and can be seen easily—things like package deformation, rupture of the film, and the like.

The handling of the time-temperature-pressure relationship is a technique which must be worked out in practice with a given heat-sealing material on a given sealing mechanism doing a particular job. It is seldom possible for even the most well-informed manufacturer to tell the user exactly what temperature, for instance, to use with his material, because this will vary according to the job the user wants done as well as according to his equipment. Large packages running at high speed, for instance, will take more heat away from the sealers and require more heat than smaller ones run at lower speed.

In handling and in studying the temperature factor in the time-temperature-pressure relationship, the problem must be thought of as one of heat transfer so far as the equipment is concerned. As indicated above, for every seal that is made, regardless of how rapid the successive rate of making the seals, enough heat must be transferred from the sealing mechanism through the packaging material to the inner sealing surfaces to raise the sealing agent to its fusing temperature. Temperatures that are initially high are meaningless. The heat supply must be sufficient to maintain the higher sealing temperature that will insure this flow of heat through to the inner sealing surfaces of each successive package as the seals are made throughout the run. The time-temperature-pressure relationship is not hard to establish, however, particularly if the supplier, who understands his material, and the user, who understands the job can coöperate.

Mechanical principles involved

The mechanics of causing heat seal generally are effected through contact between the material to be sealed and a close-pressing, heated area of metal. Translated into moving machinery, this is done through three types of movement—reciprocal, rotary or sliding.

The simplest form is reciprocal motion and it is exemplified in the common crimp sealer, wherein two heated metal plates are brought together, pressing the areas to be sealed between them. The simplest are manually operated, with time and pressure, and sometimes temperature, left to the experienced judgment of the operator. These are improved with thermostatic heat control and in some machines complete control is given for the whole time-temperature-pressure relationship by thermostatic control of temperature and by actuating the sealing jaws with an electric motor through a drive having adjustments to control time and pressure. Various types of configuration of the sealer surfaces are used by the different manufacturers. Some form of surface configuration usually is desirable, enables a tighter seal and minimizes the slight mechanical difference so sure to occur through the warping of any metal part that is continually kept hot. Surface configuration thus minimizes occurrence of areas of too light pressure between partial areas of the sealer surfaces.

As is usual in packaging machinery, the question of which type of crimp sealer is best is not one to be argued. Rather, the question is how much the user cares to pay for the refinements which will enable closer control.

Reciprocal sealing motion is being used increasingly in wrapper and package forming equipment. Certain machines placing liners in cartons make ingenious use of reciprocally moving sealers that travel with the liner forming device. Reciprocal motion also is used in various types of machines making bags that have all seams and seals heat sealed and is not only advantageous, but one of the two forms of sealing motion to which certain heat-sealing agents are limited.

Rotary motion, as the term applies, effects a heat seal by having the layers to be sealed pass beneath a heated roller or between two heated rollers. Here the time factor of the time-temperature-pressure relationship has great effect upon the temperature factor, for the effective sealer area is only the line of tangency (actually a small area) between the surface of the wheel and the plane supporting the material to be sealed or between the two sealing wheels. If the material to be sealed moves by quickly the time allowed for heat transfer becomes very short. This situation is sometimes assisted through the use of pre-heaters which warm the areas to be sealed prior to their entering the sealer contact. Solvent activators find only limited use and then only under favorable conditions, with this type of motion. If they don't actually and obviously help they are worse than if not used at all. This is because under this type of motion the outside of the webs to be sealed sometimes tends to adhere to the wheel and the seal, still soft under the influence of the activator, gets pulled apart as fast as it gets made and never gets a chance to set up in position. This has been assisted through the use of pressure belts

3. Loaf of bread is wrapped in waxed paper, most widely used heat-sealing material, and heat sealed at ends.

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that hold the seal together throughout all the phases of the operation. Actually, this type of seal failure sometimes occurs without the presence of an activator if the material being sealed has as strong a tendency to adhere to the wheel as it has to cohere with itself. Examples of this are found, under certain conditions, in some papers having both sides lacquered and in some machine operations (rather than hand operations) with rubber hydrochloride film. In the case of materials suffering these difficulties, it is not to be assumed that the machine is a failure nor that the material is inadequate. Rather, the functional qualities or the economy of the heat-sealing material or the special advantages of the equipment should be considered and the cost of variations, either of changed operation to balance the time-temperature-pressure relationship or of minor mechanical adaptations of the equipment, should be weighed in the light of accrued advantages in use.

Sliding motion is the most widely used method of heat sealing, being characteristic of almost every wrapping machine that uses heat seal for closure. In the case of the wrapping machine it is obvious, from a simple analysis of the wrap formation, that in order to seal all avenues of entry to or from the package, the wrap must be heat sealing on both its surfaces. This means that heat-sealing material will come into contact with the sealing plates along which the wrap slides as the seal is made. Since a fusible material on being heated first becomes tacky, then reaches its fusing point, there is a tendency for some heat-sealing materials to stick to the sealing plates when there is insufficient heat supply to maintain the proper sealer temperature. There also are certain materials, such as the coatings and films derived from rubber, which cannot be made to seal with sliding motion. In the case of the rubber derivative coatings, none has yet been formulated which will retain its functional qualities, to the best knowledge of the writer, yet slip across a sealer. These coatings, even up to the point of decomposition, still remain so tacky that they will stick to the sealer so tightly that the wrap, after a very few packages are run, is torn from the package. The case of the rubber derivative film is much the same. Again, neither material nor equipment is to be condemned.

If there is too little heat supply and a two-side, lacquered material begins to stick to the sealers, it generally is a simple matter to increase the heat supply and to secure good operation. It is surprising how often the problem of heat-sealing materials sticking to sealers on machines depending upon sliding motion is misinterpreted as a case of too much heat rather than too little. Many such cases have been remedied when the operators realize the fact that, as mentioned above, many heat-sealing agents, while being heated, first become tacky then actually fuse. It is during this insufficiently heated tacky stage that adhesion to the sealing plates most seriously occurs. If the material is one of those that simply will not seal with a sliding motion, its functional advantage or its economy should be weighed in the light of cost of getting new equipment or adapting old equipment to the proper type of sealing motion.

With this type of motion, as with the other types discussed, the time-temperature-pressure relationship is paramount and the temperature must be considered as a problem of heat supply and as a rate of heat transfer within the time available for that transfer.

Much work has been done on the kind of material to be used for the sealers. Copper has been found desirable because its thermal conductivity allows more uniform heat distribution over its entire area and because it resists chemical reaction with the resins used in heat-sealing materials, which often have a high acid number. Brass, easily formed into parts, is widely used and has good thermal conductivity, although it is not so resistant to corrosion as copper. Stainless steel has been widely and effectively used and has given long, satisfactory service. Cast iron is proposed by some engineers, but has not found widespread application, probably due to its sometimes porous structure and lower thermal conductivity.

In this discussion of heat sealing, there has been no attempt to discuss the many ways of taking advantage of heat sealing in actual package form. As a means of mechanical closure it is simple, direct and can be very sure. It can contribute tremendously to the functional abilities of packaging material because it is the link that completes the chain of protective qualities in a good package, closing the last entry or exit for moisture vapor, water, grease, contaminating aromas, etc. The actual package to be made more effective through heat-sealed closure may be chosen from many forms, as the marketing requirements, the shape, the size or the physical or chemical properties of the product dictate. Bags made from sheet or film with its entire surface capable of heat sealing or made with an imprint enabling heat seal or just the top and/or the bottom, packets made by sealing two sheets of film or paper together around their four edges, pouches made the same way or by folding a sheet back upon itself—these latter in sizes ranging from quite small to very large—liners placed in cartons either as pre-formed bags or as bags formed with heat seals right on the package-forming machine, wraps, plain, printed or transparent, with or without inner supporting carton—all these are forms of packages available through heat sealing. Machines ranging from the simplest inexpensive foot-power crimper to the most complicated automatic package forming, filling and sealing set-up are available in wide variety from reputable and very capable engineering firms. Materials ranging from the most ordinary waxed sulphite through the glassines and the lacquered or hot melt coated papers, through the cellophanes with their heat-sealing coatings and the films that are entirely thermoplastic, the specially coated foils, to complex lamination of combinations of these materials with themselves or even more complex laminations of various of the materials so that each may lend its qualities to a combined job on packaging—all are available for heat-sealing work. Each requires its own terms of handling, though many are similar, and each reaches its best use only through coöperation between supplier and user in learning the optimum conditions under which the needed qualities are made most readily available.

Decorative materials

The country is in its third year of war. Each succeeding year there has been less glamor material for gift packaging. The present scarcity of pulp and paper and the necessity of saving every pound of pulp for the most essential uses indicate a new low in gift wrapping materials until such time as happenings on the war front change the whole situation.

Current limitations

Converters of decorative papers under M-241-a are limited to 65 per cent of the tonnage consumed in the manufacture or assembly of such converted products during the corresponding period of 1942. Transparent materials for wrappings, boxes, ribbons are completely out for purely decorative purposes until further notice. Because of the limited quantities of decorative papers that manufacturers are permitted to make, designs have been standardized for year-round use. Patterns for these standard lines are for the most part stripes, florals, patriotic motifs suitable for any season. Christmas designs will be found in limited supply, but some of these will be the same as those used other years. Companies who make them have been too busy turning out war contracts for protective and identification papers to devote the time and labor necessary for new decorative papers.

In addition to the pulp and labor situation, metal rollers for embossing, printing or calendering are scarce. When old equipment wears out, there have been no priorities for replacement except when the new equipment was necessary for direct war work.

The highly decorative effects formerly achieved by metallic foils and papers printed with metallic inks have been out since almost the beginning of the war. Until the future of tin, aluminum, lead, copper, and other metals is clarified, there is little likelihood that packagers will be able to obtain such packaging supplies. If any of such materials are seen around on counters, they are undoubtedly remains of prewar stocks which some manufacturer was lucky enough to find. Such supplies have not been manufactured for decorative packaging since 1942 and precious little is left.

Most manufacturers of decorative packaging supplies at this time have been too busy on war business to give much serious thought to postwar business.

Will luxury packaging return?

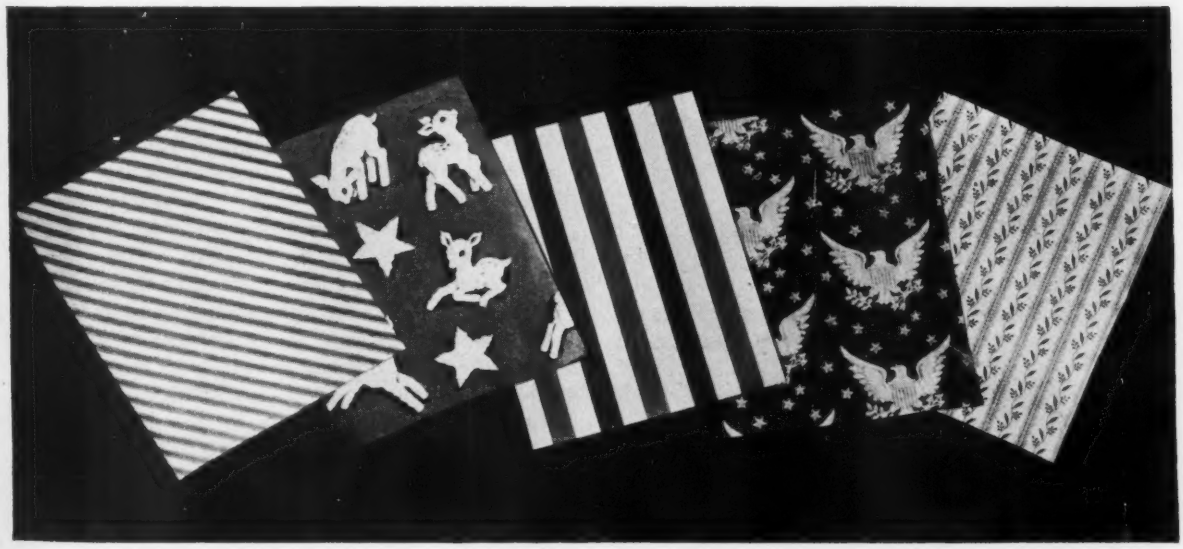
As soon as the last gun is fired, however, the desire for luxury packaging will be unrestrained. Companies that haven't changed their packaging in years are already talking about redesign simply because they haven't been allowed to do so for a long time. They will be prospects for every kind of decorative material to enhance their products in a competitive market.

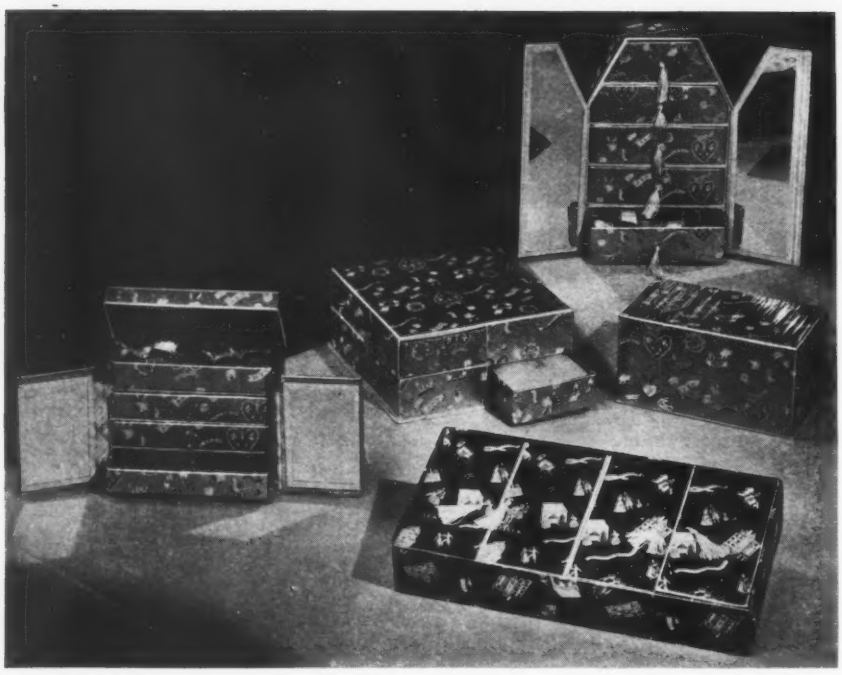
There will not only be a return to the frills and curlicues of former years in the cosmetic field, but in all lines of luxury goods.

Many makers of standard lines of merchandise, formerly packaged for holiday occasions—Christmas, Easter, Mother's Day, Father's Day—will resume special gift-wrap practices. Such lines have shed this type of packaging almost entirely for the duration. Even standard unit packs for many lines have been cut down.

Cigarette, food and liquor items, formerly put in special dress for the holiday trade, probably will go back

1. Decorative gift papers standardized for all year-round use, rather than special seasonal designs, are now popular.





2. Individualized papers printed with metallic inks like those for Altman and Kuhne candy boxes are now scarce, but will be back and much desired after the war.

into gift wrapping when rationing is over and liquor production is resumed.

Department store practice

What department stores will do about store gift wraps after the war is at this time uncertain. Because of the paper situation, most stores have cut down their practice of giving a free gift wrap to every one who asks for it, make a small charge for gift wrapping service or have cut out the practice entirely.

In store management there are two schools of thought which will affect the future. Certain store operators may wish to discontinue the free gift wrap permanently to cut down overhead. Others will want to go back to it as a good-will builder and promotional asset. Permanent discontinuance could be maintained, however, only by mutual agreement of all stores in a community. The moment one store goes out of line and gives its customers better wraps than its competitors, others will be sure to follow suit.

A great deal will depend on consumer demand. If consumers want gift wraps in a postwar buyer's market, they will probably get them.

During the thirties, stores took great pride in their individualized gift boxes and wraps. They gave a great deal of attention to the selection of individualized, embossed designs for box covers and individualized patterns for their store papers. In 1940 and 1941, obstacles in price and handling of printed and laminated cellophane had been overcome to the point where some of the leading New York stores had adopted such materials for Christmas wrappings on every gift package they sold. One store was even using a foil wrap.

Opinion in decorative material circles is that once the war is over and everybody can get the supplies he wants, stores will swing back to where they left off in 1941 with their gift-wrapping practices.

Wartime developments will undoubtedly add new types of materials to the decorative roster. One company said it had learned a great deal about wartime protective papers, particularly laminations, which will be of immense value to them in producing decorative protective papers for civilian consumption after the war. A ribbon manufacturer is looking forward to the time when he can make ribbons out of new transparent films that have such characteristics as waterproofness, greater strength and versatile printability. He also expects to make ribbons of nylon for the high-priced lines.

Packagers are already looking for design trends, although it is perhaps too early to make any general predictions. Some of the popular priced toiletry producers are trying to forecast the future of the current vogue for all-over small floral patterns. Other stylists are trying to determine whether the release from the strain of war will be revealed in the use of more brilliant colors. Some paper stylists feel that there has been no definite trend in design since the "modernistic" or geometric patterns went out of style and don't believe there will be another trend until something entirely new or a revival arrives to stay.

Occasionally certain motifs played up by some of the women's magazines are adopted and last a short time. An example of this is the "daisy and feather" of the last two or three years. Main thing to be remembered in paper design, however, is that it be distinguishable from previous designs and that it be presented in harmonious colors.

Tissue paper is almost the first item that comes to mind in gift wrapping. The best tissue, of course, is the No. 1 white which is a full-bleached tissue made of all-

sulphite finish. No. 2 white and Manila are second in appearance but fully as good for protective purposes—packing garments, glassware, etc., which must be unwrapped before being displayed. These types contain about 40 per cent ground wood pulp which is cheaper than sulphite but is not as strong or good looking as No. 1. The top grade is excellent for wrapping silverware or metal products which tarnish readily, because it is free of sulphur; generally white No. 1 is used for silver, and kraft No. 1 for hardware and similar non-luxury items. There is also a wide range of colors for No. 1 tissue which can be used most advantageously to give "life" to packaging which might otherwise be on the drab side. Black or brown tissue is frequently used to wrap suede shoes, protecting them from white lint. A waterproof tissue recently developed will be heard from in increasing quantities without a doubt.

Box coverings

Of course one of the most important uses of decorative paper is that of covering paper boxes and this forms the largest field of consumption. What applies to decorative paper as a wrap is just as true for a box covering. The shortages exist and must be met in the same spirit. Whether a box is designed for a utility tool or a jewel, some sort of covering is envisaged when it is designed, and it is not out of place to give the boxmaker some basis of information on which to choose the coverings that still are or may in the future be available.

The following list includes practically all standard kinds, but the point must be emphasized that while certain types are listed, it is no guarantee of availability.

Uncoated box papers—The kind of paper, such as rag, sulphite, kraft, or groundwood, which is to be coated, embossed, etc. This may be antique, natural finish, or super-calendered.

Coated box papers—Prepared by several processes, as follows:

Matt Coated: A casein or clay coated paper made on a brush coater or roll coater, or some type of brushless coating machine.

Brush Finished: A coated paper whose surface is polished by brushes.

Plate: A coated paper, finished smooth by cold rolls through pressure in a stack calendering machine. For a very high finish this paper is sometimes subjected to steam before being calendered.

Friction Glazed: A coated paper whose surface is polished by heated rolls in a friction calender, friction being produced by the faster rotary action of the steel polishing roll against the slower cotton roll.

Mica: Paper whose coating material consists of ground mica crystals to give it a sparkling, finished appearance.

Flint: A coated paper whose surface is highly polished by being rubbed across the sheet with flint stones. This process is slow but effective.

Waterproof: A paper coated and then top-surfaced with waterproof material, such as casein or gums; or coated once with heavily sized color; or mixed with waterproofing gums.

Waterproof Lacquers: Coated papers using pigmented pyroxylin lacquers, which produce an unmottled surface with antique or high-gloss finish.

Flock: Paper coated with varnish on the surface of which is shaken or blown finely powdered cotton, wool, rayon or silk; commonly known as *Velours*.

Metallics (now under severe restriction)

Real and simulated metallic effects on all coated papers produced as follows:

Gold, platinum, tints—Produced by grinding bronze (gold), aluminum (silver) and copper, with casein and other gums or with pyroxylin lacquer; paper generally stack calendered to produce smooth and brilliant appearance.

Silver glazed (silver coated)—Paper coated with "argentine," a precipitate of tin, which is first dull gray in color, but is polished to a silver finish by a friction calender. "Argentine" finish is now also available in gold and colors, both plain and embossed.

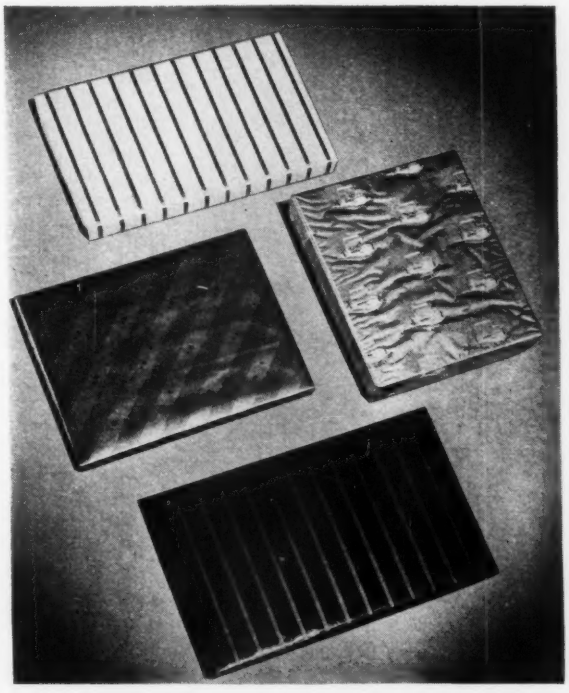
Pyroxylin coated—with lacquers in bright, dull, and pearly effects.

Half fine metallics—Produced by laying patches of a thin copper or aluminum alloy about five inches square on paper that has been coated with an adhesive. The patches are allowed to overlap in order to form a continuous metallic surface and the overlapping edges are brushed to remove any surplus.

Foils—Produced by applying to paper a continuous sheet of metallic foil, usually tin, aluminum, zinc, or their alloys. The foil is bonded to the paper by adhesive.

3. Will department store gift wraps of printed and laminated cellophane be back after the war? Probability is that they will be. Photo Shellmar Products Co.

3



Fancy papers

Fancy box-covering papers are either embossed and tipped with colored or metallic ink, or printed in designs of one or more colors. They may be decorated in mottled, speckled, streaked or blended effects, or in a definite design in any of several processes, such as wall paper, or other rotary-printing machines; intaglio printing; print or ink embossing; or topping.

KIDDER: Oil-ink surface printing from curved plates locked on a roller form and registering each impression as the paper runs beneath.

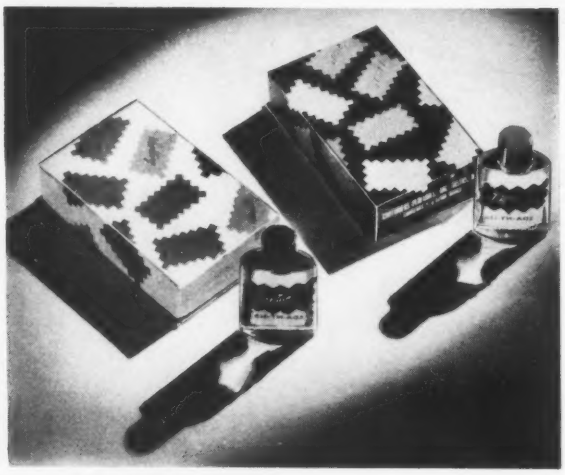
WALL PAPER: Water-color surface printing in one or more colors from relief-pattern rollers, one for each color, registered to make the complete design.

ANILINE: Stained or printed or both, with rubber rollers and relief-cut patterns—generally with alcohol-gum colors.

4. Cannon Mills for years before the war gift packaged towels. Such proud gift lines should return. 5. Examples of individualized papers for Couturiers Perfumes, Inc.



4



5

INTAGLIO or ROTOGRAVURE: Papers printed from a pattern engraved on a copper roller by the photogravure process or by the use of a pattern mill. The ink, which may be water color, aniline, oil, or lacquer, is wiped off the roller by a thin blade set across it which controls the amount of ink by the angle of the blade and the depth of the engraving.

PRINT EMBOSSED: See *Embossed* below.

Embossed papers

By an embossed paper is understood any type having a pattern in relief, produced by any of these processes:

REGULAR: A steel pattern roller and a wet paper-matrix roller are mated together.

FRICTION EMBOSSED: The pattern is pressed against a smooth paper roller run without gears, which permits a slight friction as it makes contact with the pattern. Friction is produced by the use of cold and hot pattern rollers, the latter being bored and piped for steam heating. The combination of pressure and friction causes a deepening of color in the area of the pattern.

PRINT EMBOSSED: Embossing and printing in one operation by the application of ink to the embossing pattern.

TOPPED AND EMBOSSED: A two-toned decoration made by applying color through a roller to the surface of the embossing.

SPANISHED: Color applied to the entire surface of a sheet and then scraped off with a blade, which leaves varied tones of the decorating color depending on the varied depth of the embossed surface.

Embossing designs

COMMON: Patterns in common use by many manufacturers of embossed paper. For instance: Skytogen and certain leather-grains, moire, basket weave, Persian lamb and swirl designs.

EXCLUSIVE: There are several hundred different embossing designs which have been originated or purchased by individual manufacturers who thereby own these designs exclusively. Most manufacturers have exclusive designs of their own and many such designs are protected by registration at the United States Patent Office. The Glazed and Fancy Paper Manufacturers' Association, 902 Union Trust Bldg., Providence, R. I., maintains a registration bureau of these designs for the protection of its members and to answer inquiries from customers and users.

Descriptive terms

The following descriptive terms are commonly connected with box papers, their sales value, or qualities:

FABRIC DESIGNS: Papers printed in designs that imitate various fabrics, commonly known as "fabric prints;" or embossed in imitation of fabrics, such as rep, linen, burlap, and others.

LEATHER-GRAIN: Papers with designs like grains in leather produced by embossing, ink embossing, spanishing, printing, or coating. Common examples are alligator, seal, walrus, caracul, etc.

XUM

Uncle Jake says:

INGENUITY plus COURAGE plus WORK equals MIRACLES*





* A timely thought from KVP

MAKERS OF

FOOD PROTECTION PAPERS

KALAMAZOO VEGETABLE PARCHMENT COMPANY
PARCHMENT · KALAMAZOO · MICHIGAN
BRANCH PLANTS IN PHILADELPHIA, PA., AND HOUSTON, TEXAS

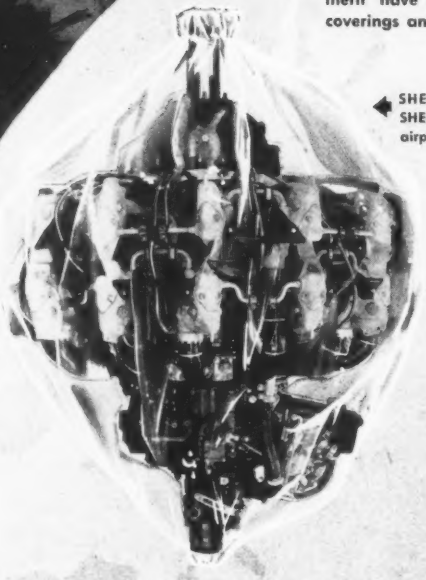
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WAR

placed a new responsibility on the Packaging Industry—the delivery of our war materials to battle fronts the world over in *perfect condition and ready for instant use.*

SHELLMAR engineers, working with every available material of merit have met the challenge with some of the war's outstanding coverings and packages.



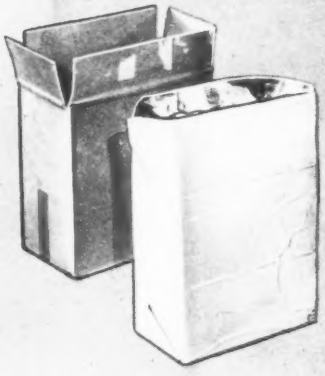
◀ SHELLMAR LIQUID FILM No. 170 (Lamination of Pliofilm with SHELLMAR Thermoplastic) was developed for packaging complete airplane engines, sub-assemblies and parts for the Air Corps.



▲ SHELLMAR LIQUID FILM No. 941 (Lamination of Cellophane with SHELLMAR Thermoplastic) protects the Army's Field Ration "K".



▲ SHELLMAR SARAN TUBES (970)—Form the moisture barriers in Method II Packages now delivering machine guns to the front—*ready to fire without cleaning.*



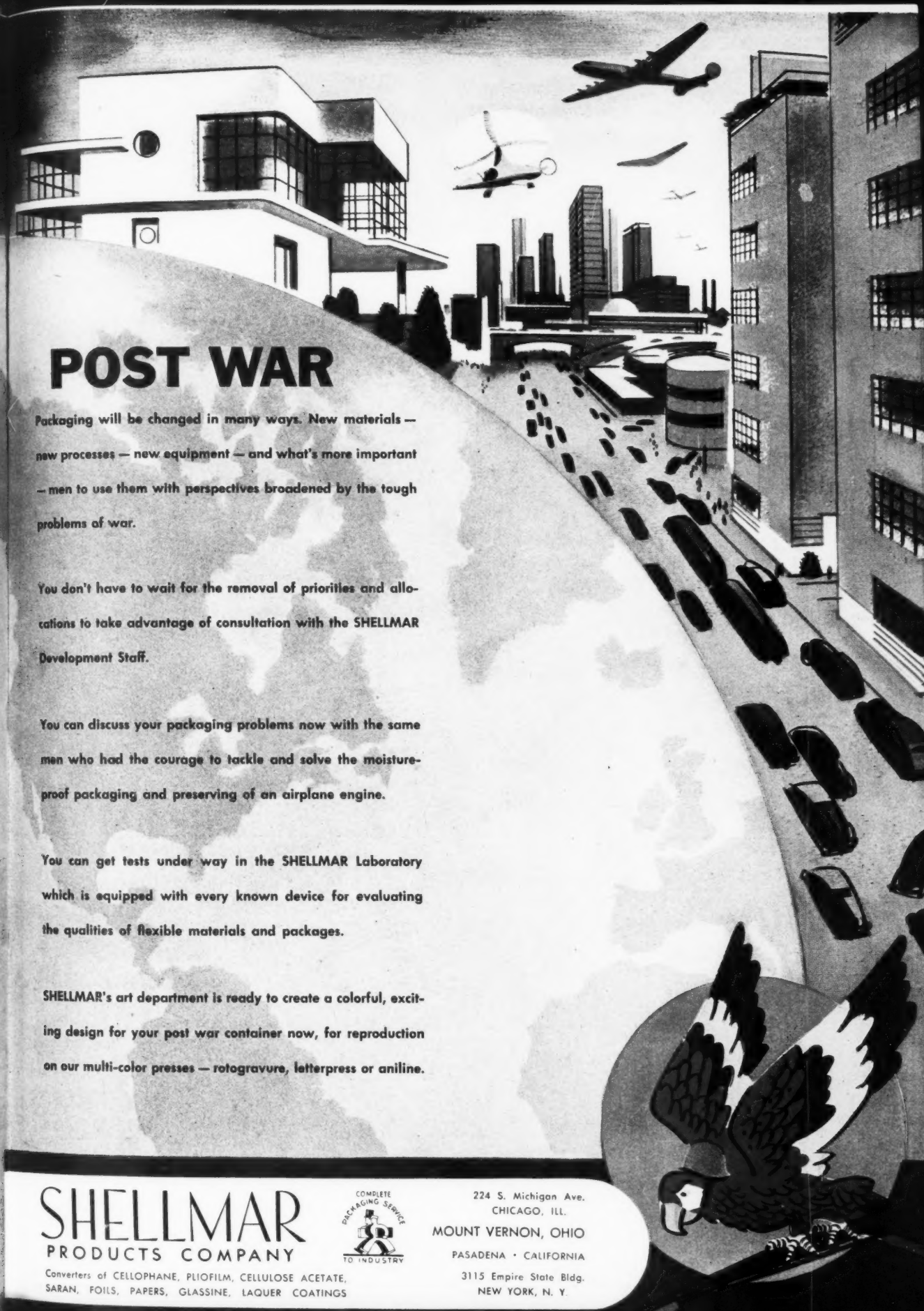
◀ "SHELL-FLEX" No. 770 (cloth, paper, metal foil, heat sealing coating) and No. 903 (paper, metal foil, heat sealing coating) developed for Method II Packages protecting delicate equipment for all Army branches. No. 635-A (metal foil, paper, cellophane, heat sealing coating) protects dehydrated foods for Quartermaster Corps.



▲ SOLDIERS IN CELLOPHANE!—Like creatures from another world are today's doughboys, each with a ready-to-use "tent" of gas-proof cellophane as protection against irritant gases.

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POST WAR

Packaging will be changed in many ways. New materials — new processes — new equipment — and what's more important — men to use them with perspectives broadened by the tough problems of war.

You don't have to wait for the removal of priorities and allocations to take advantage of consultation with the SHELLMAR Development Staff.

You can discuss your packaging problems now with the same men who had the courage to tackle and solve the moisture-proof packaging and preserving of an airplane engine.

You can get tests under way in the SHELLMAR Laboratory which is equipped with every known device for evaluating the qualities of flexible materials and packages.

SHELLMAR's art department is ready to create a colorful, exciting design for your post war container now, for reproduction on our multi-color presses — rotogravure, letterpress or aniline.

SHELLMAR
PRODUCTS COMPANY

COMPLETE PACKAGING SERVICE TO INDUSTRY

Converters of CELLOPHANE, PLIOFILM, CELLULOSE ACETATE, SARAN, FOILS, PAPERS, GLASSINE, LAQUER COATINGS

224 S. Michigan Ave.
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MOUNT VERNON, OHIO

PASADENA · CALIFORNIA

3115 Empire State Bldg.
NEW YORK, N. Y.

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ROTO-LITH

...printers

CELLOPHANE of ACETATE AND FOIL PAPERS... *rolls and sheets*

ROTO-LITH Ltd

15 W. 18TH ST., NEW YORK 11, N. Y.

SYLVANIA CELLOPHANE TRADE MARK REGISTERED BY SYLVANIA INDUSTRIAL CORP.

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Williams

—has been the central source for *Box Covering Papers* for half century . . . We co-ordinate the activities of paper manufacturers, coaters and converters . . . The result of this complete service is an ever growing number of satisfied customers.

During these trying days should you have difficulty securing a paper and occasional disappointment try *Williams* first.

War time restrictions may not always permit us to fill your wants exactly, but from our stock of many lines of box papers, we will offer you a suggestion that we believe will please both you and your customer.

Remember to "*Try Williams First*"

CHARLES W. WILLIAMS & CO., Inc.

AUTHORITIES ON BOX COVERING PAPERS

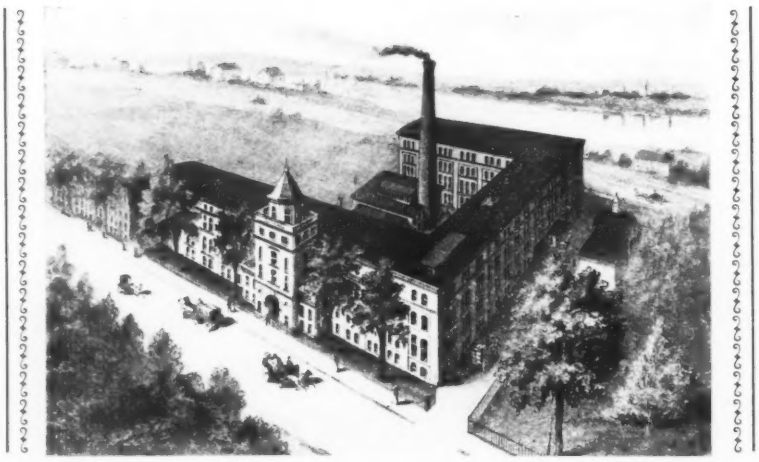
624 So. Miller St.
CHICAGO 10

303 Lafayette Street
New York 12, N. Y.

167 Oliver St.
BOSTON 7

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YES, we're still doing business at the same old stand



THIS ILLUSTRATION SHOWS OUR "NEW FACTORY" WHEN BUILT (IN 1896)

SURE, like most leading manufacturers, we've been supplying Uncle Sam with important war material.

But we have not forgotten our regular customers' requirements, not by a long shot. In spite of material and labor shortages, Middlesex has made an enviable record in delivering the goods during 1943. And Middlesex high quality has been maintained. Middlesex is a good outfit to do business with, good times or bad. And when normal, competitive times return, Middlesex will again feature "service from stock" in a great variety of packaging papers, in addition to the present limited range of standard papers.

Meanwhile, here we are at the same old stand, at your service, in the business of supplying Paper Box Manufacturers and Other Users, with the Standard Middlesex Quality papers: Glazed, Plated, Waterproof, Mica Coated, in Plain Finish and a Wide Variety of Embossed Designs.

Write today for New Sample Book of Middlesex 1944 Papers, now in preparation. Sample Sheets 20 x 26 at all Offices.

MIDDLESEX PRODUCTS CORPORATION

Since 1866

MILL AND HOME OFFICE
111 PUTNAM AVE.
CAMBRIDGE 39, MASSACHUSETTS

MIDDLESEX PAPERS

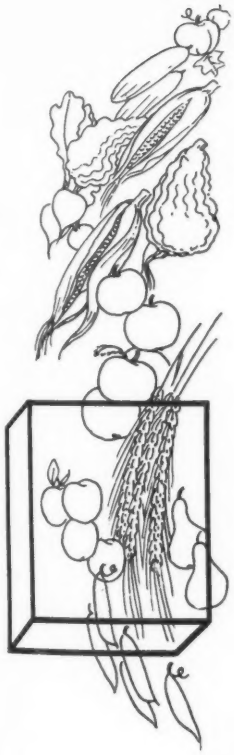
SALES OFFICES:
PHILADELPHIA,
CHICAGO

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WHEN THE FARMER'S JOB IS DONE...





THE farmer . . . like his fellow Americans in industry and commerce . . . is working to increase his production in every way. Food is a weapon of war and the growing of food and still more food is an important duty to our country. But when the farmer's job is done, we must rely upon the resourcefulness of the processors and packers of food so that the fruit of his labor may be properly preserved . . . ready for consumption whenever and wherever needed.

The scarcity of some materials has made this task difficult, but not impossible. Hundreds of new packaging ideas have been developed to meet present needs by manufacturers of paper, folding cartons, tubes, bags, and containers of all types. Our own research staff has perfected many such ideas, and our great mill at Milford, N. J., is given over almost entirely to special papers for the food industry.

Increased demands and limitations on production now make our acceptance of new business almost impossible. However, if you have a problem in the protective packaging of food, you may be sure that there is someone, somewhere, who can solve it. We keep in close touch with the new developments of leading suppliers in all fields, and we can often still serve you by finding some alternate solution to your requirements. Requests for information and advice will always continue to receive our cooperative and intelligent attention.

RIEGEL PAPER CORPORATION

342 MADISON AVENUE • NEW YORK 17, NEW YORK

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We can't all make guns

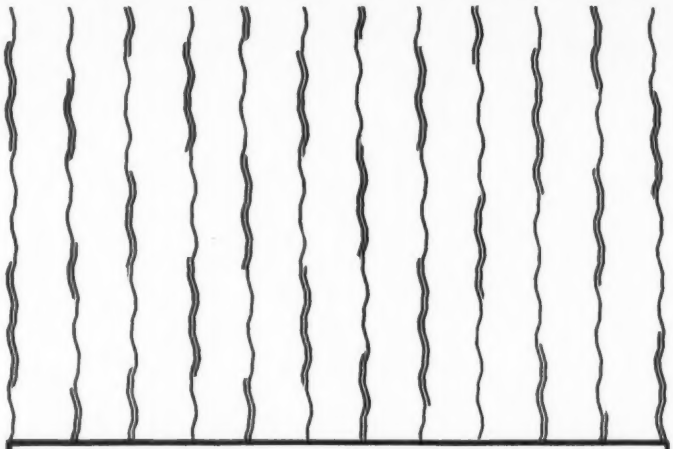
We don't like to talk of our part in the war effort, for there are so many industries whose products are doing much more than ours to defeat the Axis. But we can't all make guns, and although the war won't be won or lost with Riegel Papers – they do have many places in American factories where they are able to help the man behind the man who holds the gun.

Over 100 Riegel Papers are being used for the protective packaging of food – for domestic use, for the armed forces and for lend-lease. Other special papers go to electrical manufacturers, shipyards, uniform makers, draftsmen, airplane builders, cable plants, plastic laminators and many other industries where they are being used in the actual manufacturing process.

Some of these papers are on priority, some are restricted, some are not – but if you need a special paper, we may be able to supply it due to our wide manufacturing range. If not, we will try to help you find someone else who can.

RIEGEL PAPER CORPORATION
342 MADISON AVENUE · NEW YORK, N. Y.

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This is a Sample of

HEAT-SEAL

LABEL PAPER

BY HAZEN-HOLYOKE

This **HAZEN** paper is recommended especially for food labels to be applied to cellophane. The heat-seal is rapid and permanent; there is no slippage, no messy adhesives and applicators; and no jams in the machine.

Write for samples and prices to

HAZEN PAPER COMPANY

HOLYOKE, MASSACHUSETTS

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PORT HURON PACKAGING PAPERS



For Protection, Conversion and Display

PACKAGING

Bread Wrappers
Candy Wrappers
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Super-Calender Papers
Tobacco Packaging
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Cosmetic Packaging
Baked Goods Protection
Razor Blade Wrappers
Toilet Tissue Wrappers
Laminated
Florist Tissue
Plain Waxed Paper
Gum Wrappers
Transparent Carton Wrappers
Printed Opaque Waxed Carton Wrappers
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Waxed Tissue

LINERS

Cereal Carton Liners

GENERAL AND CONVERSION USAGE

Locker Papers
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Transparent and Opaque Bag Papers Coating
Tag Stock
File Folders
Address Tags
Pin Tickets
Butter Carton Stock
Wallets
Bleached Waxing
High Grade Wrapping
Tympans
Gaskets
Bristol
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Specialties

Mill Brand Lines and Made-to-Specification Papers

HURONETTE, Tag, Bristol and Cover — A sturdy, bleached white, plate finish stock ideal for printed or lithographed pieces.

PORT HURON CYLINDER PAPERS — Made to specifications.

PORT HURON MACHINE-FINISHED and MACHINE-GLAZED PAPERS — Made to specifications.

PORT HURON COVER (Leather Embossed) — A strong stock available in a wide range of colors.

PORT HURON LEATHERETTE (Plate Finish) — Tag, Bristol and Cover. Offered in a variety of attractive colors.

HURON FEATHERWEIGHT BOND — Six colors and white in 9 and 10 substance unglazed, also white unglazed opaque. Glazed white in 9 and 10 substance.

HURON SILVERWING BOND (Watermarked)—9 substance white and six colors unglazed. White glazed, 9 substance.

HURON CARBON PAPER.

Consult Port Huron About Your Packaging Requirements

PORT HURON SULPHITE & PAPER CO.

MILLS: Port Huron, Michigan

NEW YORK CHICAGO SAN FRANCISCO

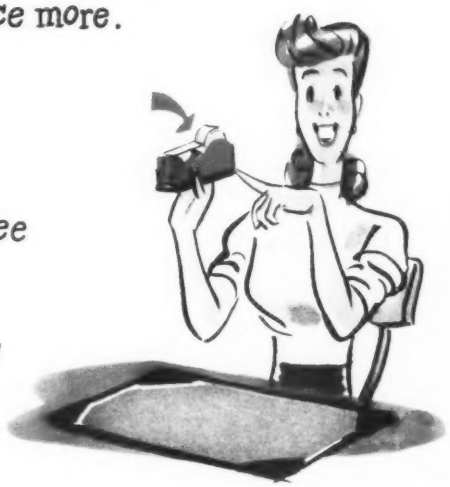

When?
See other side

The Texcel Tape that's holding up
The "When?" sign that you see
Is all we've left—unless you've got
A firm priority.





Because it does so many things
All Texcel Tape's at war.
But soon—within the year, perhaps—
It may be back once more.



When that day comes and Texcel's free
You'll find this tape will "click"
In office and in industry
Where tape must really stick!

Actual size of large-size roll

Texcel Tape



CELLOPHANE TAPE — STICKS WITH A TOUCH

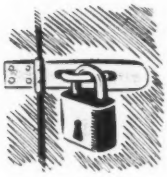
Made by Industrial Tape Corporation
A Division of Johnson & Johnson
New Brunswick, N.J.

WHAT HAPPENS TO A FANCY PAPER MANUFACTURER IN WARTIME

1 ***DOES HE HIBERNATE?***

Sorry, we're not sleepy.





2 ***DOES HE CLOSE UP SHOP?***

That doesn't appeal to us, either.

3 ***DOES HE FIND SUBSTITUTES FOR STRATEGIC MATERIALS?***

We did!





4 ***DOES HE CONVERT HIS PRODUCTION TO WAR NEEDS?***

Now you're getting warm — but that's not all.

5 ***DOES HE PLAN FOR POSTWAR?***



You said it — our designers could no more stop designing those fancy papers that perennially set the packaging world on its ear, than they could stop breathing. So they're busy designing . . . designing . . . designing a group of the finest patterned papers that ever came out of a press — designs that will one day give fine packages the color and sparkle and brilliance we have come to expect on quality merchandise.

LOUIS DEJONGE & CO.

161 SIXTH AVENUE • NEW YORK, N. Y.



Fitchburg's converting and packaging papers are serving today to help speed the day of Victory. These papers are being used for many products that are classified—ESSENTIAL. With the experience gained in past years and through these critical times, our technicians and personnel are well equipped to help you solve your present and post war problems.

Listed below are some of the Fitchburg papers manufactured for many essential products.

Alkali Proof Papers
Coating Base Stock
Gumming Base Stock
Foil Mounting Papers
Box Wrap
Pyroxylin Base Papers
Lacquering Base Papers
Printing Papers
Board Lining
Laminated Papers

THE CONVERTING PAPER DEPARTMENT OF THE PACKAGING INDUSTRY

★ **Fitchburg Paper Company** ★

250 PARK AVENUE, NEW YORK CITY Mills: FITCHBURG, MASSACHUSETTS 11 SOUTH LASALLE STREET, CHICAGO

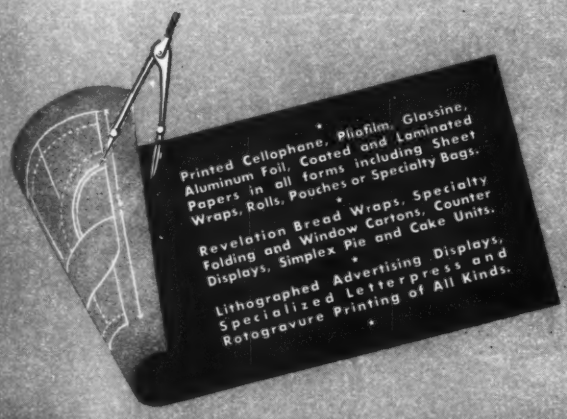
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you can't beat EYE APPEAL!

Functionalism — protection — price . . . all are factors in considering any package. But the most potent factor of all is still "EYE APPEAL". Despite even the sobering influence of war, experience has shown that the consumer frequently remains oblivious to practical features but is moved to action by the subtle appeals of color and design.

That is why — in addition to extensive research facilities — this organization has developed one of the most effective creative art departments in the nation. A MILPRINT designed package stands out . . . creates attention . . . stimulates action!



MILPRINT Inc.

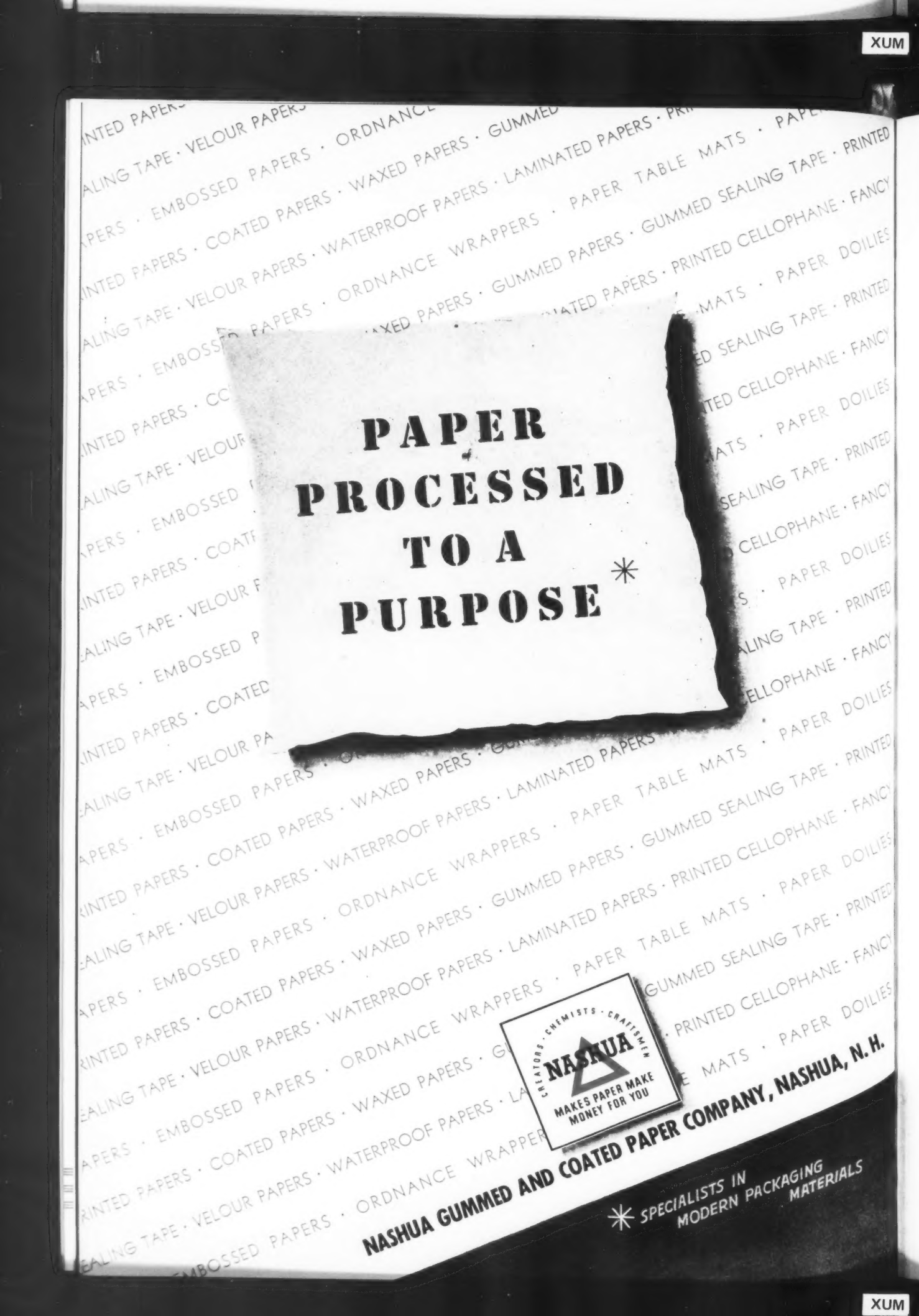
PACKAGING CONVERTERS · PRINTERS · LITHOGRAPHERS

PLANTS AT MILWAUKEE · PHILADELPHIA · LOS ANGELES

SALES OFFICES IN . . . SAN FRANCISCO · CHICAGO
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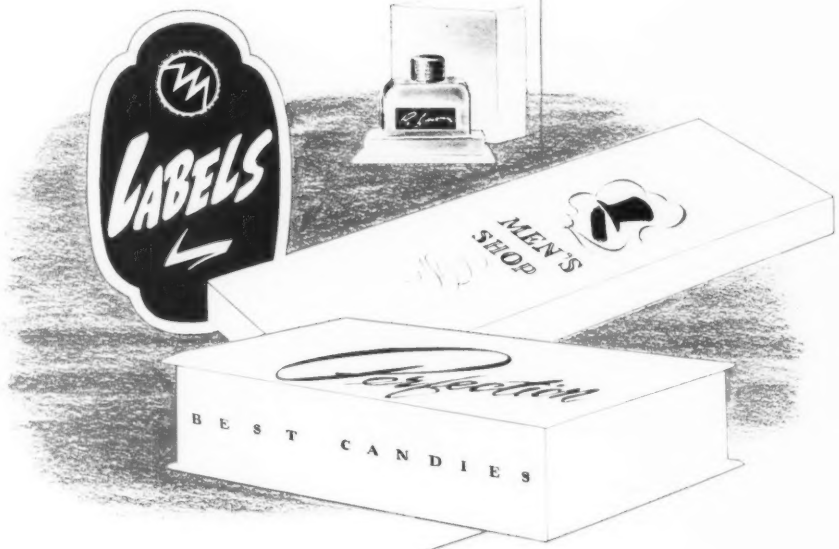
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PAPER
PROCESSED
TO A
PURPOSE *
CREATORS · CHEMISTS · CRAFTSMEN
NASHUA
MAKES PAPER MAKE MONEY FOR YOU
NASHUA GUMMED AND COATED PAPER COMPANY, NASHUA, N. H.
* SPECIALISTS IN MODERN PACKAGING MATERIALS

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POSTWAR PLANNING

. . . for Packages



Champion Kromekote*

*Kromekote is the registered trade-mark of The Champion Paper and Fibre Company's cast coated high finish paper.

Beauty and Sales

with Champion Kromekote

The end of hostilities in Europe means a wild scramble to produce new goods and dress them up in competitive array before an exacting buying public with burning pockets. Old products, too, must be redesigned and redressed if they are to retain favor in a rapidly changing world. Now is the time to plan new packages and labels of Champion Kromekote, a beauty treatment for the finest goods, old and new, a rare and exclusive setting for your choice creations. Wartime conditions for many months seriously have curtailed production of cast coated high finish Champion Kromekote, but full scale production will parallel that of your own operations and needs. This then is the time to obtain samples of Champion Kromekote and get ready with your new boxes, labels and wraps.



THE CHAMPION PAPER AND FIBRE COMPANY

HAMILTON, OHIO

Paper and Fibre Company's cast coated high finish paper.

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POST-WAR IMPRESSIONS
. . . in the making now

Booming business means more packages, more opportunities for your product or store to make its customers ambassadors of good-will to the general public. Lay the foundation now for a greater post-war demand in a competitive market by adopting



Private Design

PACKAGING PAPERS

Your individually-created design on boxes, bags and wrapping paper becomes an easily-recognized symbol . . . building prestige and sales.

IDEAS...
WITHOUT OBLIGATION

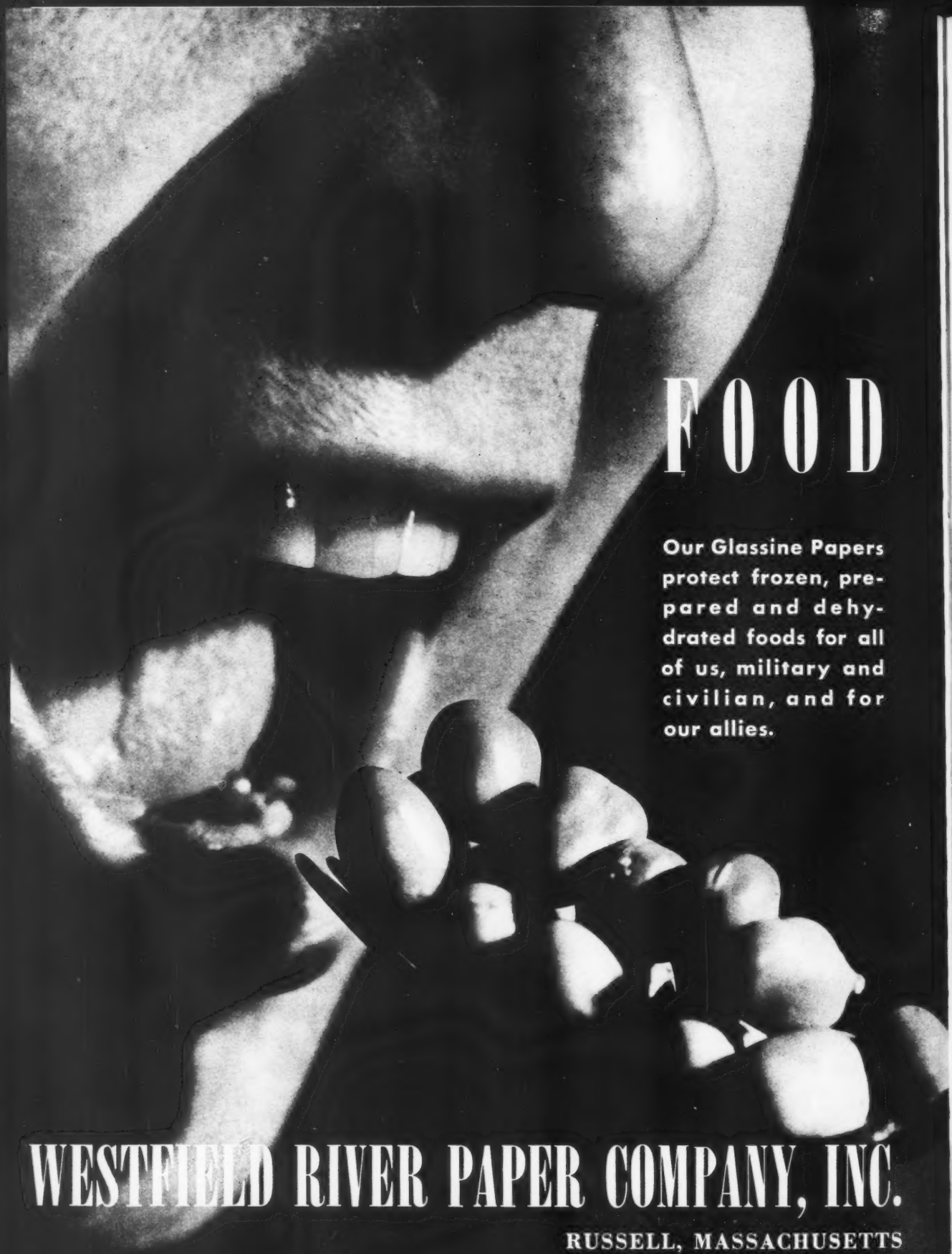
Our experience serving America's leading manufacturers, wholesale and retail establishments will be helpful to you. Let our CREATIVE BUREAU submit suggestions in harmony with your merchandise and traditions. You will be surprised with the effectiveness and economy of our PRIVATE DESIGN PLAN. Write for information.

SPECIALISTS IN PRIVATE DESIGNS . . . PRINTED AND EMBOSSED

MATTHIAS PAPER CORPORATION 165 W. BERKS ST., PHILADELPHIA 22, PA.

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FOOD

Our Glassine Papers protect frozen, prepared and dehydrated foods for all of us, military and civilian, and for our allies.

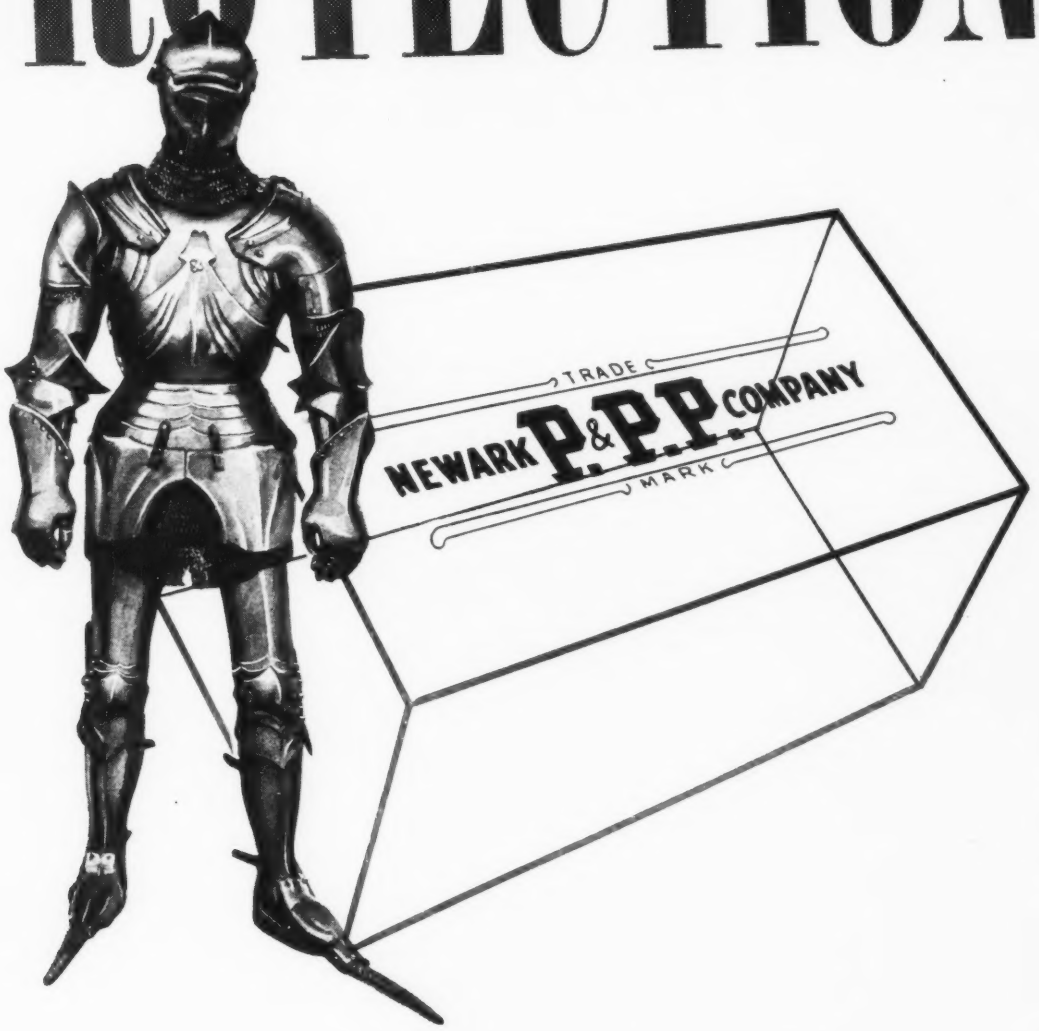
WESTFIELD RIVER PAPER COMPANY, INC.

RUSSELL, MASSACHUSETTS

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PROTECTION



For over forty years our papers have been furnishing an armor of protection for the products of American manufacturers. Today the complete Newark line includes the latest developments in protective papers for packaging purposes. Your inquiries are invited.

NEWARK PARAFFINE & PARCHMENT PAPER CO.

Manufacturers and Converters of Protective Packaging Papers

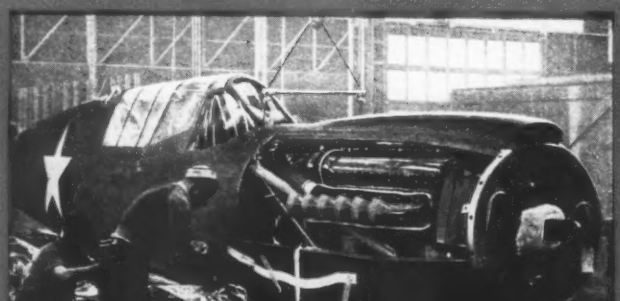
50 JELLIFF AVENUE • NEWARK, NEW JERSEY

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Pliofilm

PROVEN IN WAR...



P-40 Warhawk "cocoon," shipped in Pliofilm, ready for immediate uncrating.



Jewel-like precision of all American aircraft engines retained by Pliofilm.

AIRCRAFT engines and even complete fuselages go to war now wrapped and hermetically sealed in **Pliofilm.** And wherever they are shipped they emerge as bright and spotless—as free from rust—as ready for action—as the day they left the factory.

Before **Pliofilm** proved best for the job, an aircraft engine was protected against moisture by a coating of heavy grease that took up to 75 man-hours to apply and remove.

No other pliable, transparent packaging material has saved so much precious time in war—or withstood so severe a moisture test.

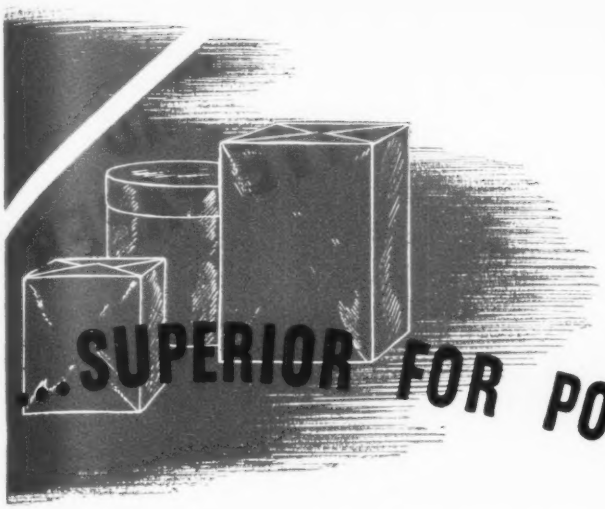
After the war is won, more **Pliofilm** than ever before will be available to the packaging industry, because production has been increased to meet the big war demand.

Remember then what **Pliofilm** does now. And consider **Pliofilm** always as *the packaging material that keeps moisture where you want it.*

Whether your product requires preservation of moisture content—like garden-fresh vegetables—or must be kept moisture-free—like sulpha drugs—**Pliofilm** will be the answer to your packaging problem.

And gleaming, transparent, attractive **Pliofilm** will help you do a merchandising job for your customers in the postwar market.

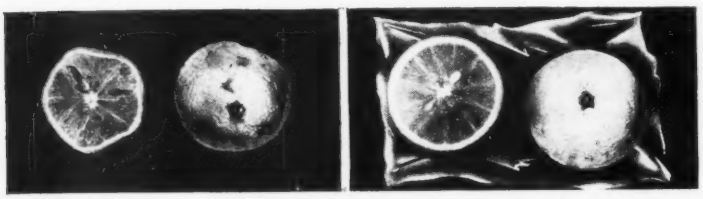
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...SUPERIOR FOR POSTWAR PACKAGING

WHAT PLIOFILM CAN DO FOR YOU

Actual experiments conducted by the Agricultural Experiment Station of the University of Florida



ALL THESE ORANGES ARE FOUR MONTHS OLD! *But the still-perfect ones were "stretch-wrapped" in* Pliofilm. *Official report: "The oranges wrapped in* Pliofilm *lost less than 2% of their initial weight after four months' storage—the original taste and appearance of the fruit were unchanged—Vitamin C content very slightly diminished."*

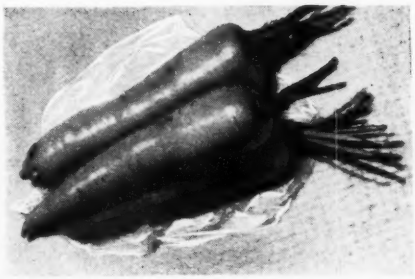
• • •

Pliofilm keeps moisture where you want it. It seals moisture *in* not only fruit and vegetables, but cheese, frozen foods, meat. And **Pliofilm** seals moisture *out* of dehydrated food, peanuts and potato chips.

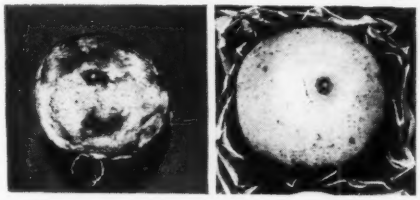
Pliofilm is not just for foods. It has thousands of applications as low-cost protection for pharmaceuticals, chemicals, tobacco, precision instruments, cables and all moisture-sensitive products. For information write: Pliofilm Sales Dept., Goodyear, Akron 16, Ohio.

BUY WAR BONDS to Speed Victory

Pliofilm—T.M. The Goodyear Tire & Rubber Company



EIGHTEEN MONTHS IN PLIOFILM! *Remember what happens to ordinary unwrapped carrots after a week in the icebox? These* Pliofilm*-protected carrots were stored at 37° —for a year and a half. Official report: "Loss of weight was negligible, and the carrots held their color perfectly —retained their firmness and vitamin content."*



PLIOFILM MADE THE DIFFERENCE. *Both these grapefruit were kept in storage* five months *at 70° F. The one wrapped in* Pliofilm *was still perfect. Official report: "The grapefruit wrapped in* Pliofilm *showed no loss of flavor and little shrinkage as compared with the unwrapped fruit—the original appearance of the fruit was unchanged—Vitamin C content very slightly diminished."*

THINGS ARE BETTER PACKAGED IN Pliofilm

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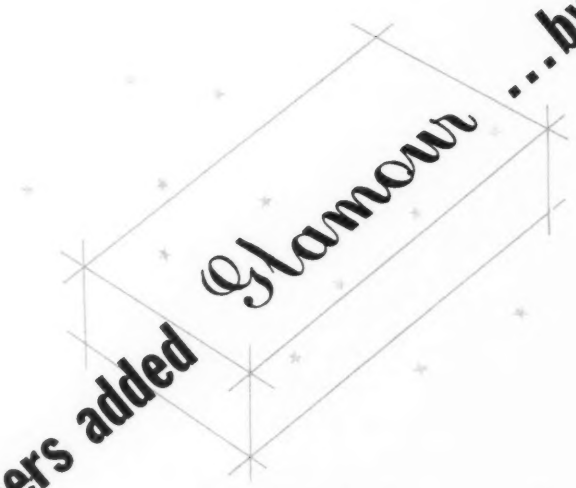
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merchandisers added Glamour ...by the sheet



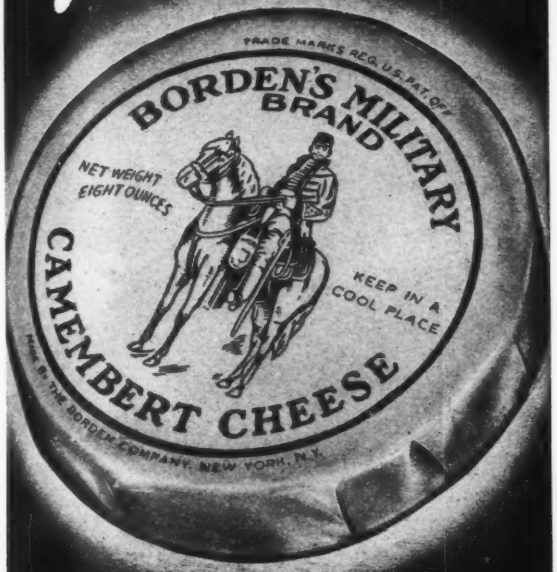
Not gilding the lily, but more like framing Gainesborough's "Blue Boy", is the smart merchandising idea of quality packaging. Twenty-five years ago, leading candy, jewelry and perfumery houses selected Hampden's Damask as the fitting box covering for their quality products. Through all the intervening years, Damask has remained the choice of these discriminating buyers. ☆ ☆ ☆ Due to war conditions, the production of Damask and other quality papers by Hampden have necessarily been curtailed. In the post-war era, however, with all indications pointing to an unprecedented demand for quality goods, these high grade papers will be available in larger quantities, new finishes and a fascinating assortment of colors. HAMPDEN GLAZED PAPER & CARD COMPANY, *100 Water Street, Holyoke, Massachusetts.*

HAMPDEN, established in 1880, was one of the earliest producers of decorative box coverings.

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FOIL-LIKE BRILLIANCE with CELLOPHANE PROTECTION

A beautiful wrapper . . . with the bright sheen of polished silver . . . and a strong protective coating . . . tasteless . . . odorless . . . tear-resistant . . . that's Celumina, a replacement for war-scarce foil. Celumina has many advantages. It handles easily, wraps fast, and withstands scuffing. It unwraps in one piece and can be re-wrapped. Attractively printed in one or more colors. For camembert, blue, process and other cheeses. Ask for samples.



SPECIAL COATED CELLOPHANE POUCHES AND WRAPPERS

We have been supplying cheese manufacturers with transparent cellophane cheese pouches and wrappers for a number of years. These protective heat-sealed wrappers come either unprinted or printed in one, two or more colors. Sheets and pouches are furnished in any size desired.

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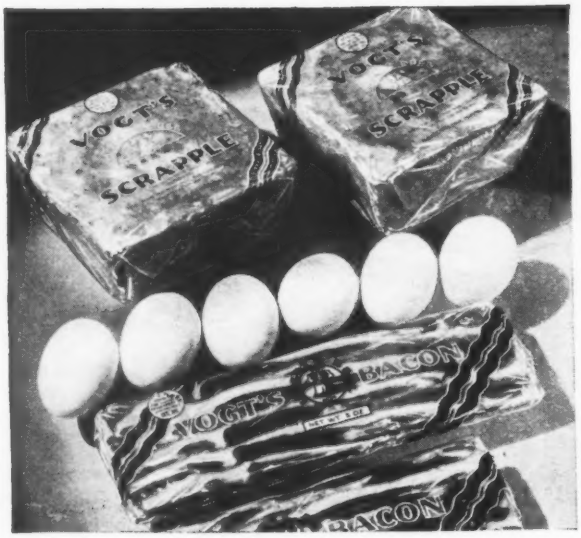
In War or Peace

THE STANDARD

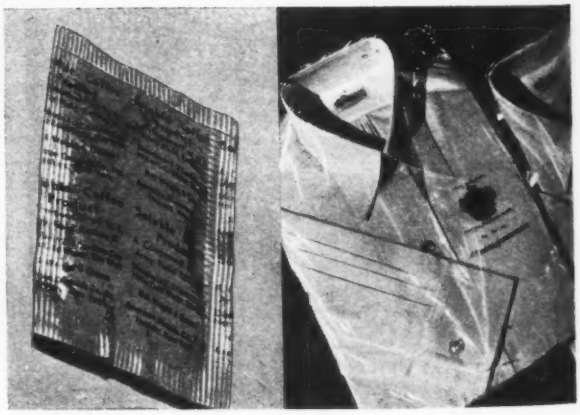




One of the great developments of military packaging has been the use of combinations. The specifications were admittedly too tough for any one material. In this ordnance wrapping, Lumarith contributes its part—chiefly as a barrier against water, oil and grease.

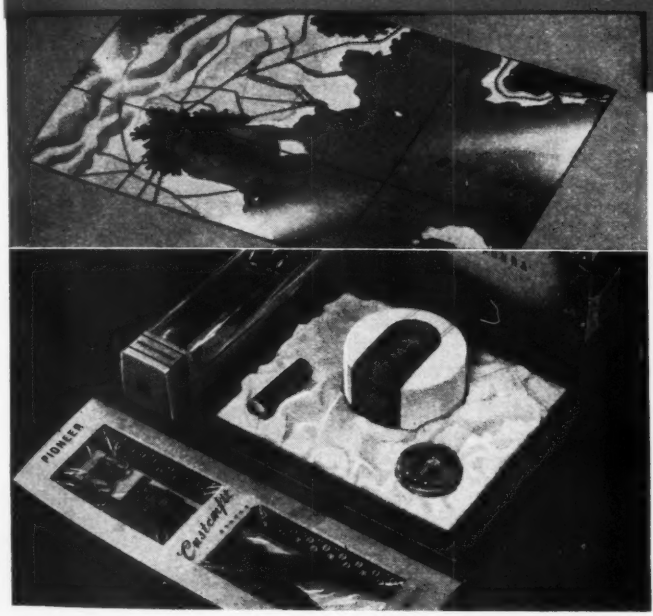


Lumarith's long preeminence in the field of transparent grease-proof wrapping has been a factor in many military applications. On food products, it is ideal as a plain or printed wrap and meets the requirements of B. A. I.



The sales appeal of Lumarith wraps has long been a foregone conclusion. The utility factor is coming into greater prominence over the entire field of packaging from dehydrated foods to shirts.

FOR QUALITY WRAPS Lumarith* FOIL a Celanese Plastic





Packages laminated with Lumarith had gained top position before the war. The three shown were excellent examples. During the war, the protective feature of laminated maps, charts and instructions has become a familiar subject with millions of men in the service.

The wrapping of spare parts in the now famous combination material seems a far cry from the sparkling transparent wraps which are associated with Lumarith. This very application emphasizes that Lumarith has much more to contribute than its transparency.

Lumarith has been in such great demand for vital wartime applications that use in many of its former civilian applications was curtailed by Government order. However, those in the trade realize that these military applications have tremendously increased the market for transparent wraps of Lumarith. Celanese Celluloid Corporation, *The First Name in Plastics*, a division of Celanese Corporation of America, 180 Madison Avenue, New York City 16.

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TRANSPARENT MATERIALS

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ARTCOTE pyroxylin coated papers have always been noted for their color and lustre.

Now they're real museum pieces—scarce as rare coins and too precious to waste.

And so, although we'd ordinarily be printing our advertisement on the shiny surface of one of our own papers, today we're glad to be able to show you a small, tipped-on sample of one of them.

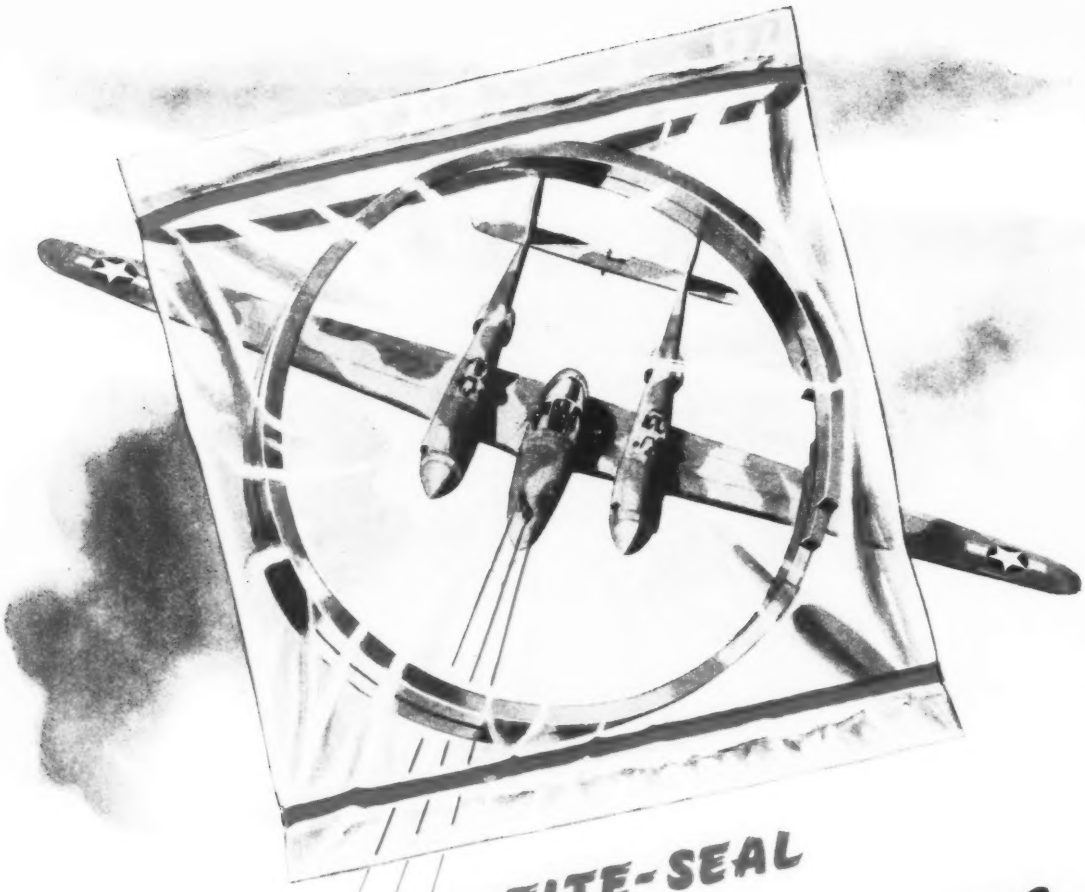
The tip-on is a sample of the embossing and printing that can be done on ARTCOTE papers. After the war all the well-known papers and a great many new designs, colors, coatings and embossings will be shown.

Although ARTCOTE pyroxylin coated papers are scarce, they are presently available in limited quantities.

We invite your inquiry.

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Availability is only one reason for TITE-SEAL popularity; visibility is another. One look identifies the contents, sealed against rust and corrosion.

The unmatched advantages of TITE-SEAL Bags proved in war, will protect in peace, parts and articles for shipment and stock.

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Reynolds' foresight and ingenuity combined to give America a great new source of aluminum. Because of this proved ability to look ahead, it was only natural that Reynolds, the world's largest foil producer, was asked to help solve the tremendous problem of wartime packaging. Again Reynolds came through... this time with a new type "fighting-foil," now protecting food, drugs, munitions, and supplies on all fronts. Reynolds new packaging material is really *armor-clad protection without the use of steel.*

Our reservoir of packaging experience, enriched by global research, is your dependable source today for product packaging and market development assistance. We are now collaborating with manufacturers in many fields on foil's manifold postwar uses. May we help you? Consult our representatives in any of the larger cities, or write direct to us.

REYNOLDS METALS COMPANY · FOIL DIVISION · GENERAL OFFICES · RICHMOND, VA.

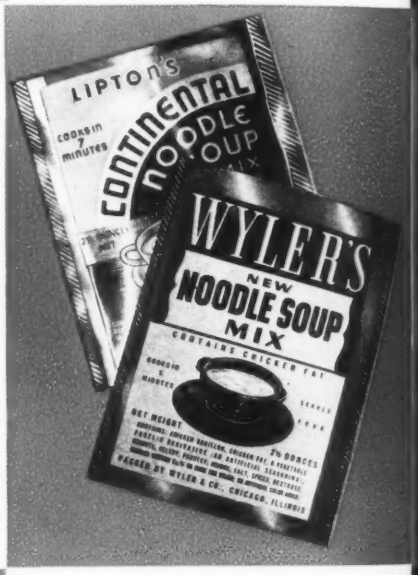
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Reynolds Titewraps insure high speed production. Heat, glue or wax sealed. Moisture-vapor proof. Multi-color gravure printing. Proof against moisture, heat, light, insects.



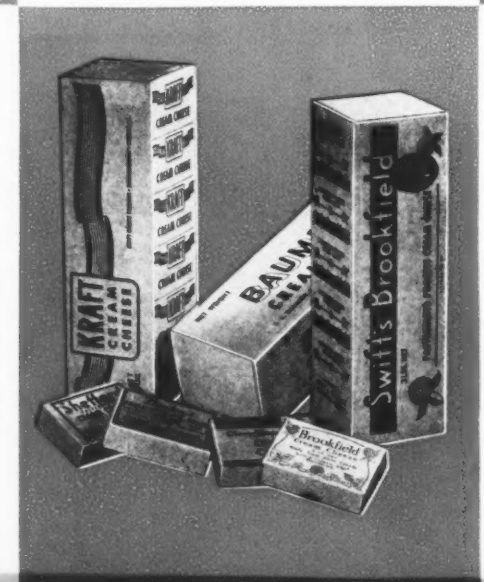
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Reynolds special patented "Pour-it" top cartons. Foil-lined or foil-laminated to special stocks. Also ply-metal cartons (foil inside and out.)



DAIRY PRODUCTS

Foil is recognized as the practical wrap for soft cheeses. Until government restrictions are eased, Reynolds is prepared to supply cheese wraps of the best materials available.



CHEWING GUM and CANDY WRAPPERS

High speed wrapping is facilitated by Reynolds precision-cut wraps. In both sheets and rolls, printed in multicolor gravure.

PACKAGING SERVICE



LABELS

Reynolds supplies both square and die-cut labels, also embossed labels, printed in finest quality multi-color gravure.



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Reynolds produces the nation's outstanding heat sealed envelopes and bags for dehydrated foods, drugs, chemicals, etc. Investigate the many types of Reynolds bag and envelope constructions.



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Foil-lined, strong, reinforced fibre container for safe shipment of valuable merchandise such as tea, etc... Moisture proof material for manufacture of multiwall bags for use in the shipment of such items as dry chemicals, flour, cement and other hygroscopic products.



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Authoritative tests of all flexible packaging materials prove conclusively that Reynolds Fighting Foil is the most efficient barrier to moisture-vapor transmission known today!

Reynolds Metal Packaging Material Meets These Army-Navy Requirements

1. *Positive Protection Against Moisture-Vapor Transmission.*
2. *Immersion-Proof. Keeps Water Out!*
3. *Protection Against Insect Infestation, Odors and Light.*
4. *Substantial Saving in Tin, Steel and Other Strategic Materials.*
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6. *Saving in Weight.*
7. *Serviceability Under Export Conditions.*

In the All-American Package Competition, this Reynolds "Fighting Foil" won a *Special Award!*



Reynolds Metals specializes in foil for all packaging needs: In sheets or rolls, plain, decorated, embossed or laminated to a wide range of other materials.

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Here is a group of the fine fancy papers we offer to packagers in all fields. These are available for immediate delivery from stock. We reserve right to limit quantities on any one order to insure equitable distribution.

Kupfer Brothers operate plants in England and in the United States, excelling in embossed finishes, waterproof papers, mica and flint surfaces. There is a Kupfer paper for every season, every product.

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Protection Plus—

Wax has already proved its worth as a protective element in shipping food, ammunition, medical supplies and other materials of war to the world-wide battlefronts! These three "B-Squares" are also the answer to your post-war packaging problems!

Be Square Special Waxes offer you Protection Plus against the common enemies of packaged materials—moisture, oxidation, dust, heat, cold—and many others.

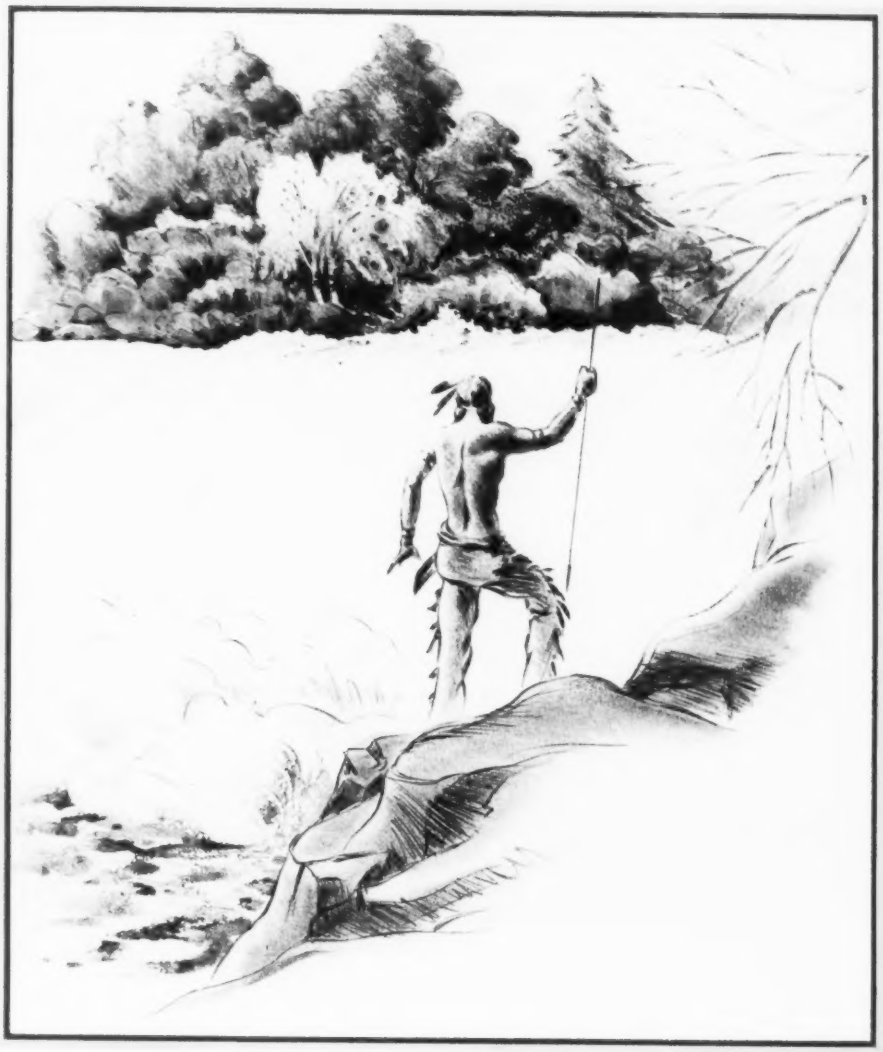
Whether you'll want black, amber, or white—Melting Points of 160/165°F or 180/185°F—for packaging food, electrical supplies, metal products, tobacco, or chemicals—their distinctive properties are especially suited to your particular problem.

NOW is your chance to test the vast post-war "Protection Potential" of Be Square Special Waxes. An unlimited field of application awaits you with these superior products. Write for full particulars and samples *today!*

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- *High Moisture Vapor Resistance*
- *Odorless and Tasteless*
- *Micro-crystalline Structure*
- *Flexible in Thin Films*
- *Chemically Inert*
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WYOMISSING

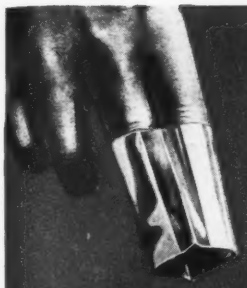


WYOMISSING . . . this was the name given by a tribe of Delaware Indians, known as the Lenni-Lenape, to a winding stream on whose banks they set up their lodges. The name is believed to have been an outgrowth of the word Wyoming, and has been interpreted as meaning . . . A Small Flat Bottomland. ¶ Today that pleasant stream meanders through the beautiful town that has grown up around it, and taken its name. But the name Wyomissing has another significance. It is the hall-mark of Quality in fine Flint Glazed Papers.

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★ a simple, clean application

★ slips over—shrinks on

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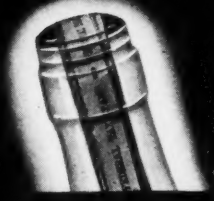
★ prevents leaking or evaporation

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ARMY E NAVY

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*Trade Mark Reg. U. S. Pat. Off. †U. S. Pat. Nos. 2141722, 2141776

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YOUR GOVERNMENT WANTS YOU

...To continue distribution of foods and other essential commodities; to fully protect these items until they are consumed; this protection, if possible, should use a minimum amount of vitally essential material.

Because changes occur so rapidly; because each product packaged demands a different treatment; because materials that are not vital today, may be tomorrow, we believe it best to handle each packaging problem individually.

Full information on your problem can be obtained by writing Packaging Division, Cupples-Hesse Corporation.

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WHAT IS THE CLIMATE *inside* YOUR PACKAGE?

THAT'S what counts! Outside, the climate may range from steamy, soaking tropics to the thirsting arid air of the desert—with only the walls of your package to preserve the INSIDE climate to protect your product.

No one film or foil or paper can answer all packaging problems. That's why Dobeckmun offers a whole range of packaging materials, plus the many converting techniques and varied equipment required.

Dobeckmun's testing facilities, fully equipped and staffed, can duplicate hot humidity, creaking coldness or even the rarefied air of the stratosphere, to prove that the packaging suggestion prepared for you is the best for your product and problem.

Will your package stand up? Can it be improved? Send us a few loaded samples for tests and ideas. It involves no obligation.

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PACKAGE DESIGN—to provide better sales appeal, tested protection and practical handling.

CELLOPHANE BAGS—from ounces to gallons—printed or plain—single or duplex.

"TRITECT" CELLOPHANE—wax-laminated film for extra protection.

LAMINATED FOILS—combined with cloth, paper or film.

PRINTED FILMS AND FOILS—in sheets and rolls.

LABORATORY TESTING — complete facilities for testing packages under all conditions of climate and service. Insure the right answer by pretesting your package.

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Sylvania* Cellophane

● SYLVANIA* cellophane is of two basic types: moistureproof and non-moistureproof. Each type is manufactured in a variety of weights. Through various combinations of type and weight it is possible to supply the most desirable and durable sheet for a particular purpose.

All types and grades of SYLVANIA* cellophane are air, dust and greaseproof. Some are heat-sealing. Most grades can be made flame-resistant if so ordered. There is a wide variety of colors.

The moistureproof grades are mostly "heat-sealing" but where necessary or desirable, they can be supplied without this characteristic. Certain grades are made to withstand low temperature, others with a special "anchored" coating which also gives the additional desirable characteristic of being waterproof.

Most of these qualities can also be combined, making it possible to secure a grade of SYLVANIA* cellophane that will fit most any use.

Since the start of the war, our research laboratories have worked closely with the military and naval authorities to meet their exceptional requirements and specifications. These developments should be of benefit to civilian and industrial uses after the war.

We have in our Technical Service Division one section which is devoted exclusively to the development and improvement of packages and another section which specializes in industrial uses of cellophane.

We invite you to take advantage of the experience and assistance of our research and technical staffs.

SYLVANIA CELLOPHANE IS SERVING MANY WAR PURPOSES

SYLVANIA INDUSTRIAL CORPORATION
General Sales Office: 122 East 42nd Street, New York 17, N. Y.
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ARMY E NAVY

SYLVANIA CELLOPHANE

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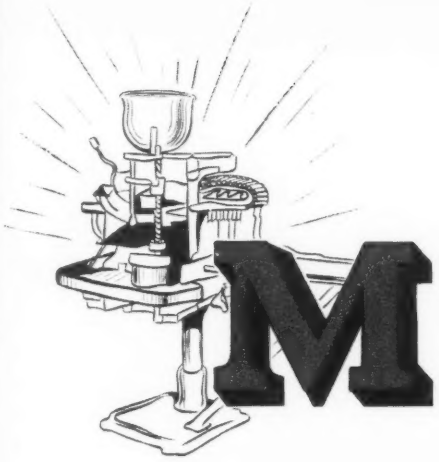
Packaging Preview

Although the war has limited our main production to essential protective wrappings, our post-war planning has already produced several new outstanding box covering creations. These samples are a preview of what is to come.

THE MARVELLUM COMPANY
Holyoke, Massachusetts
DISTRIBUTORS IN PRINCIPAL CITIES OF UNITED STATES AND CANADA

No. 492 White Aqua-tint

XUM



MACHINERY AND EQUIPMENT

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Elements governing mechanization

by C. H. Lambelet

When postwar competition has fully set in and industry has become reconverted to operative activity, it is easy to foresee that mass-production methods in the packaging of merchandise will more than ever be in demand as an economy measure. Many who have heretofore gotten along with hand or semi-automatic operations will be asking: "Will I be warranted in mechanizing my production line?"

This question is an important one as it involves a major investment in equipment which, if not operated sufficiently and efficiently, might become so much "dead wood." If the proper type of equipment is not installed, its productivity might be too large or too small, not elastic enough in range, not applicable to proper operation on various types and sizes of present or future contemplated packages and possibly requiring too much mechanical attention for the size and personnel of plant in which it is installed. At just what point in growth one should resort to machines is difficult to answer.

If one takes into consideration the various types of equipment which are used in packaging today, whether it be wrapping, cartoning, casing and sealing, liquid or dry filling, tube filling, capping, labeling, etc.—the possible combinations of these various types and the varying conditions obtaining in different plants makes the question even more complex. The factors and conditions and problems which should be taken into account when one is considering switching from a hand operation to a mechanical one follow.

How about the package?

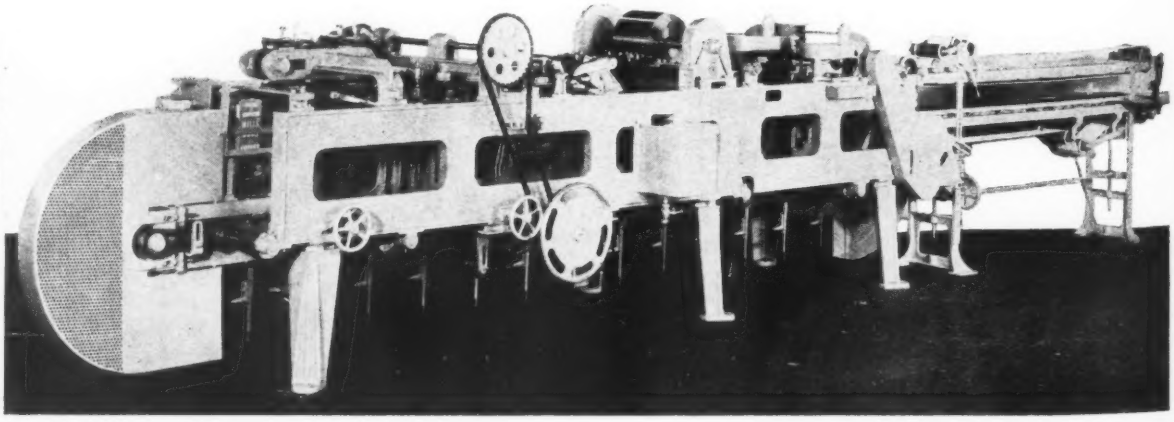
First, forget production. Strange as it may appear, the first factor to determine is whether or not the package lends itself to mechanical handling. Because irrespective of the levels production might reach, if that package which at the present time is being fabricated by hand methods does not lend itself to machine handling, the installation of equipment might become more of a headache than a help.

As an example here are two cases wherein a machinery company was asked to supply equipment for two different packages which were handled manually. In both of these cases, production warranted equipment but the type of work which the machine would be called upon to do was of such a nature that in one case there was (and is) no machine which could handle the job and in the other there were but two types of machines which could do the work. In either case, as the packages came off the machine they would have to be rehandled manually in order to correct the defects which, due to the design of the package, would necessarily occur.

In designing a package, even though one may contemplate handling it manually, it should be kept in mind that at some future time it might become so successful as to warrant handling it mechanically. For instance, if it is a glass container, the glass supplier should be told that possibly at a later date this package is to be handled mechanically and asked to determine whether its design will lend itself to such handling. As an example, the throat or neck of a bottle might be such that, while no difficulty would be encountered in filling it by hand, when handled on an automatic filler, the size of the opening, the length of the neck, in fact, its very shape, might prevent the user from getting the full productivity of the automatic machine. It might be too top-heavy to convey readily; its contour might cause it to "climb" or "lock" on the conveyor chains, or its shape might not lend itself to accurate registration in labeling.

Machinery is still machinery and while its functioning

1. Some operations call for full mechanization and the use of machines like this full-automatic roll closure and top sealer for the rapid handling of lined cartons at the rate of 90 per minute. Photo Battle Creek Bread Wrapping Machine Co.



is almost human at times, still there are certain human attributes which cannot be built into it, of which, possibly, a most important one would be the faculty or ability to compensate for continually varying conditions.

The bottles might vary 1/8 in. in width. This does not mean anything to the hand operator, but can cause troubles in equipment. Labels might vary 1/8 in. in dimensions and still the hand operator will center them on the bottle and make a perfectly acceptable package, whereas in a machine operation the location of the labels will vary or even "skew" with resultant unsatisfactory appearance.

When changing from manual to mechanical operation, in order to give the user full benefit in productivity with consequent savings, equipment has to be catered to and given accurate material to handle. While the machinery manufacturer realizes that he cannot count on receiving perfect packages and package parts and while he can compensate for a certain amount of inequalities in materials and still have his machine produce acceptable packages, yet the limitation of his equipment is much greater than that of human hands.

Hands or machines?

Every packaging machinery manufacturer has been up against this problem and it is not always easy to convince the prospective user of equipment that greater care must be taken in the materials when handled mechanically instead of manually. However, it is all a question of educating the package suppliers and the packager's own employees. When once this fact has been drilled into them there is no great difficulty in supplying material acceptable to the machine.

When contemplating the mechanization of an operation which previously has been done manually and when contacting the machinery builder, it is best to allow him to criticize frankly the materials that are being used. While the first reaction might be that any changes suggested are for his own benefit, one should consider that he is trying to eliminate headaches which he can foresee in a package. The machinery builder eliminates them for the user and makes his equipment a profitable investment for his customer. He is far-seeing enough to realize that the first sale of equipment might possibly be the beginning of a further friendly, and, for both sides, an advantageous business relationship.

Even if suggestions which are made might cause additional expenditures for material, in the vast majority of cases the benefit which will derive from mechanization will more than offset this.

Semi-automatic or automatic?

Another difficult question to decide is whether semi-automatic or fully automatic equipment should be installed. To answer this question is practically impossible as the conditions in each plant vary. This should be determined by a study of the individual case rather than by some hard and fast rule.

While many manufacturers at times or during certain portions of the year, could use fully automatic equipment, they have found it more economical and wiser to have semi-automatic equipment in conjunction with an efficient conveying system. At such times they so set up their semi-automatics in conjunction with the conveyors to form what might be called a "semi-automatic-automatic" line. Such an arrangement has many possibilities, is elastic and can be changed to serve varying conditions as they arise. In these cases, skids can profitably be installed in the form of channels or "I-beams" under the machines so that they can be readily moved by means of lift trucks and placed where desired.



2

2. Some products call for semi-automatic lines. Illustration shows hand operations combined with automatic filling and cap pressing. Photo Stokes & Smith Co.

Management plays a very important part in the efficient operation of equipment. Methods that are being efficiently used, with reference to routing or handling the product for manual packaging, might be the most uneconomical as far as machine operation is concerned.

Equipment not only lives with the purchaser, but he must learn to live with it. The installation of a conveyor belt will very often repay many times the discarding of trays or racks formerly used. In catering (and the word is used advisedly) to machines, one should not be afraid to spend money wisely.

More people or more machines?

Another factor enters into the purchase of equipment. For example, a product is successful, and in order to have enough production, more hands must be hired. Floor space does not allow this. However, by proper choice of mechanization, even if only operating part time, the question of seeking new quarters, increasing fixed charges, costs of moving with its inherent effect on production, possible loss of old and trained employees, can be eliminated. There need not necessarily be an increase in the number of employees. All of this should offset the possible necessity of employing a mechanic to take care of the equipment.

On the question of mechanical supervision, it should not be forgotten that the machine which is working in the plant requires a certain amount of attention, of oil and grease, of cleaning and in general care the same as one would give an automobile.

XUM



1. Continuous-line production in the packaging and packing of drugs. Here human handling is reduced to a minimum, the operations synchronized, the machines and conveyors are arranged for the utmost efficiency. The illustration demonstrates how the straight-line type layout may be followed even if the equipment is not always literally arranged in a true straight line. Photo McKesson & Robbins, Inc.

1

Plant layout

by Gus Winckelmann

What is continuous-line or mass production? To put it simply, it could be described as *producing the mostest, the quickest, with the leastest.*

This could apply to a thousand items from airplanes, tanks, automobiles, etc., in the heavy field, down to the smallest items in the food and drug field—all sold in packages. The principles involved are the same, namely, the even and uninterrupted continuous flow of the material to be fabricated, processed or blended into the finished product ready to be marketed.

We are particularly interested in continuous-line or mass production as it affects articles of food, drink, drugs, etc.—that is, small cans, bottles or packages eventually placed on shelves or display in the thousands of retail outlets throughout the country.

It is a far cry from the old days of bulk sales, and what was accepted by our grandmothers as the usual way to purchase groceries, drugs, etc., would seem strange to us today since we are used to buying almost everything packaged.

The change in marketing methods did not just happen overnight, but instead was a rather slow process over a period of years. "Centralized packaging" was originally done by hand, then simple machines, mostly semi-automatic, were invented to augment hand labor; then machines were invented that did a fully automatic job. As time went on, these were improved upon, and American genius developed machines that can do most everything but talk (this is no doubt good, for otherwise the machines might be able to complain that they are overworked and want to go on an eight-hour shift with time and one-half for overtime). If there is no machine to do your particular job, the machinery man will no doubt invent one to meet your needs.

Many people, when they think of line or mass production, have in mind only that part of the operation that does the actual canning, bottling or packaging of the product. This is erroneous and does not go far enough. Line production should be all-inclusive, from the receipt of all raw materials to be processed, blended or whatever is necessary, the receipt of all cans, bottles or packages to be used, to the final disposition of the product in the case—ready for shipment. Otherwise, you will not be taking full advantage of the possibilities offered by line production. No hard and fast rule can be set up for laying out high-speed mechanized production lines. Each installation presents its own individual problems due to the product itself and existing structural conditions where the installation is to be made.

The building to house the operations may be of multiple or one-story construction, so it becomes necessary to arrange your operations to fit the space available. If you are contemplating the construction of a new building, you are indeed fortunate as you can then plan to meet your own particular needs. So, you see, each installation really becomes a custom-built job to suit your needs.

There are, however, certain basic fundamentals that can be applied to all layouts, namely, good continuity and synchronization of all equipment to eliminate bottlenecks and gaps, to insure a steady uninterrupted flow of the material, the packages and the finished case.

Start with the raw materials to be used, whether they be in liquid or bulk. Provisions should be made for handling expeditiously their unloading and elevation to storage tanks or bins on the upper floors so that, as the material is required in process, it can flow to the blending or processing vessels, as the case may be, by gravity.

XUM

Gravity is still the cheapest means of conveying. It eliminates any and all mechanical and maintenance worries—no pumps, no motors—just a pipe line, spout or chute.

Automatic unloading and elevating equipment is available for almost any type of material. In addition to the older types of chain-and-bucket conveyors of various designs, air is now used extensively and efficiently for this purpose.

If the materials are received in barrels or bagged, you will find suitable equipment for handling and elevating to the upper floor. In this connection, a continuous bag or barrel elevator, taking up comparatively little space, will do a splendid job.

The main point to bear in mind is the efficient handling of all raw materials to bins or tanks located so as to permit gravity flow to the mixing or processing vessels, which in turn should be so located as to feed from them to the filling machines—again by gravity.

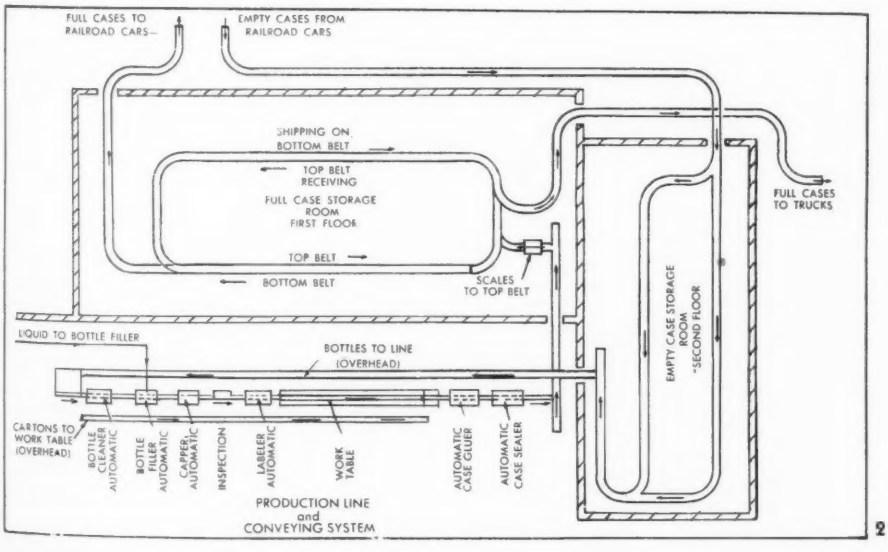
It is also essential that all supplies and materials needed be convenient to the production line where those operations necessary to can, bottle or package the product are performed. The same thought and care should be exercised in planning a layout to bring these supplies to the point where they are required. Again, from the place they enter the building to their place on the line where they are to be used, try to avoid old-fashioned manual handling, and, above all, be sure an adequate supply can be maintained to service the line at the speed the machines are operating. This will eliminate gaps or lost production.

Much can be done in this respect by the use of power. I have in mind a problem I was faced with a couple of years ago. We were receiving approximately 600 carloads a year of empty glass in re-shipper containers which had to be taken to storage on the fourth floor. The method then employed for unloading consisted of skids and lift trucks, loaded in the car, taken to the elevators, transported to the fourth floor, unloaded and returned to the freight car. It took nine men three hours to unload a car, or a total of 27 man-hours. After installing a conveyor system, this same work was done by four men in an hour and a half, or a total of six man-hours, a saving of 21 man-hours or $12.60 per car. The conveyor paid for itself in nine months, to say nothing of the other advantages gained by the new method.

Progressive operations

There are certain types of self-contained machines for some products, and they complete the entire operation necessary. But generally a production line has a multiple job which must be done progressively, each operation being performed by equipment from different machinery manufacturers. Take as an example a line bottling a certain product. We may have the following equipment: air cleaner for cleaning the bottles, filling machine, corking or capping machine, labeling machine, case-sealing machine, etc. With these various types of machines available, the packer or manufacturer still has a job ahead of him in assembling the machines and forming them into an efficient production line. For good operation, they must be connected to each other by belt, chain or other type of conveyor, and each machine must be synchronized with the others to insure an even and steady flow of cans, bottles or packages through all the various operations.

Most machines have motors built into them, and usually they are equipped with variable speed drives, but still within certain minimum and maximum tolerances. So it is important to make sure that these speeds are within the range you require, and also that the capacity of the machine itself meets your requirements. Most machines have a rated capacity at which they perform most efficiently, but beyond which the quality of the work suffers. It is, therefore, poor economy to buy a machine that can perform your work only by running it beyond its rated capacity. If you do this you are unquestionably riding for a fall. It would be like expecting a light Ford truck to carry the same load as a heavy Mack truck. It is far better, having determined to spend



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2. Ideal layout for synchronized production line and conveying system in a bottling plant. Similar efficiency can be achieved for other industries by the adoption of the principles of straight-line production.

money for automatic equipment, to spend just a little bit more to get a machine that meets your requirements. It is far more desirable to be slightly over, than under capacity. Your equipment will last longer, require less maintenance and do a better job.

Having planned a good layout from the receiving of raw materials and supplies to the actual packaging of the product and its packing into the shipping case, you should not stop there. Also see to it that the shipping case is delivered to the storage room or shipping platform with the least effort so as to complete efficiently the entire chain of operations. If possible, get away from the handling of cases on skids or wheel trucks. This method usually makes for breakage, especially if the floor is rough or uneven. Install some system of conveyors that will deliver your finished case to its final destination for storage or shipping, as the case may be. In this respect an "in transit" power belt conveyor will be of material help. This conveyor would pass through the storage room. Immediate shipments would remain on the belt to pass on to the shipping platform, and cases to be stored would be removed into storage and later put back on the belt for shipment.

A merry-go-round system of conveyors in glass storage or in products storage rooms is helpful and can be used to very good advantage. In planning your entire layout, allow yourself plenty of time to give mature thought to each and every detail, no matter how small. I have seen installations which were very good—in part—but which were sadly lacking as a complete set-up. Apparently the person who had the say was particularly interested in just one phase of the operation—and as long as that part suited him, he was not so much concerned with the rest of it. This is a sad and, over a period of time, a costly mistake.

How to plan your layout

Remember that once the installation is made, you will have to live with it. So get it right to begin with. Also, it is always well to plan for the future. Your business may expand and you will need more equipment. Therefore, try to plan in such a way that additional equipment can be installed without disrupting the original set-up. The space available will usually lend itself to several alternate set-ups, and this can very easily be determined by following a simple and somewhat childish method outlined below.

First, it is advisable to know or to have seen in actual operation the equipment you are going to install. This can usually be arranged through your machinery salesman unless the machine is a new development.

Next draw, to a generous scale, a floor plan of the building or floor space available for the installation. Then cut out templates of all equipment to the same scale as the floor plan: by moving these templates around "checkerwise" you can quickly determine the most efficient set-up possible in the space available, and also visualize alternate layouts. It is far better to make changes on the drawing board—which only requires the erasing of a few lines—than to take things for granted, install the equipment and then find you have made a mistake. The latter may be costly in dollars and cents and result in the loss of valuable production time.

In my opinion any and all time spent on careful planning pays big dividends. It is also well to get the opinion of your key employees who will possibly have charge of the new production line. Go over each and every step with them progressively. They may be able to offer worth-while suggestions which might mean the elimination of certain operators or combining certain jobs and make for a more efficient set-up—or they might make a suggestion which in itself is not important but which leads to other suggestions or thoughts that may be worthwhile. Be very careful to check all openings through which these machines must pass to reach their ultimate location, especially elevators if the equipment is to be taken to an upper floor, to be sure you have sufficient clearances. Otherwise you may be faced with the task of knocking out doors and/or windows to get the equipment in. If the machinery man is told of these "openings" limitations, he can as a rule dismantle part of the machine to meet your conditions.

All this may seem to be of no real importance but, as a matter of fact, it should be a major consideration for any well-planned layout. I have talked with people who knew that their production lines were not the most efficient, who would gladly spend the money for new equipment and the revamping of their set-up to bring the operations to a high standard of efficiency, but who felt that they could not lose any production time. There are, no doubt, cases where there would be a loss of production time, but since, with careful planning, changes can be made which would in no way interfere with production, such instances are rare. The writer has had considerable experience along this very line, and on three different occasions has accomplished a complete change-over without the loss of any production time. If you have the "know-how" and vision, the problem is not difficult. Surely the final results warrant the effort.

I have also seen a case where operations were being performed by hand which could be done much more quickly, more efficiently and with less labor with a machine, but where the owner felt that he could not afford the expense necessary to purchase the machinery. This is being very short-sighted, for whether the owner knows it or not, he is spending money every day for additional labor, money which would pay for his machine in a comparatively short time. The result is that he keeps on spending, but has no equipment to show for it and no operating savings to look forward to. Thereby he is constantly handicapped in meeting competition. Competition will become very keen when we are again on a peacetime basis, so now is the time to do your postwar planning. Investigate now what equipment is necessary to do your job efficiently. Get your plans all ready so that the moment the time comes when equipment and materials are again available you will be able to proceed immediately with completing your job. Then you will be in a position to carry on efficiently and meet all postwar competition.

Weighing & filling dry products

The accurate weighing and filling of dry-product containers is of increasing importance to packagers in view of the more rigid standards of weight and fill being promulgated by the Food and Drug Administration. The difficulties of achieving such accurate weighing and filling are further increased by the tendency—as indicated by recent administrative actions—to restrict package sizes to dimensions far closer to the volume occupied by the contents than was formerly demanded. Such restrictions reduce the orifice through which the package may be filled, make settling of material more difficult and in other ways complicate the physical problem of handling materials. Automatic machinery, however, seems fully capable of taking care of these difficulties, provided they are adequately appreciated and that they are anticipated.

Systems of filling

There are four basic methods of weighing and filling dry materials—accurate filling, gross-weight weighing, net-weight weighing and a combination of accurate filling and gross-weight weighing.

Accurate filling is perhaps the simplest method. The correct quantities of the product are measured mechanically without the use of a weighing device. One way of accomplishing this is to measure by volume. Another is to use a definitely timed or regulated feeding of the material. As long as the bulk of the material remains uniform, good commercial accuracies can be guaranteed on correctly built machines of this type. If, however, the nature of the product is such that it varies in weight per unit of volume, then measuring by this method may not be sufficiently accurate for commercial requirements.

Accurate filling is successfully utilized for such products as scouring powder, jelly crystals, dessert powder, tooth powder, face powder, cut tea for tea balls and granular salts. Many machine units are available capable of handling various sizes of packages and with speeds ranging from 10 to about 120 per minute.

Gross-weight weighing involves the use of scales which weigh not just the product alone, but, rather, the package and its contents. For accuracy by this method, therefore, there must be a relatively high degree of uniformity in the weight of packages. This may be achieved through the inherent nature of the package selected or be accomplished through the use of a package-sorting scale.*

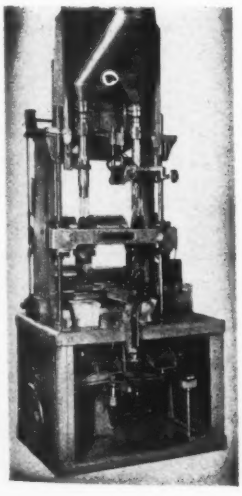
The flow of material from the feed-hopper to the package is controlled by the scale beam on one end of which the package rests during filling. Thus, when the right amount of material is dropped into the package, the scale beam trips a shut-off which stops the flow of the material instantly and passes the package ahead to the next position. To speed up production, particularly on larger sizes of packages, two scale machines are frequently utilized. The first scale fills a bulk load of from $^2/_3$ to $^9/_{10}$ of the total quantity to be filled. The final load, weighed to extreme accuracy, is delivered by a fine stream to the second scale.

Gross-weight weighing is particularly favored where

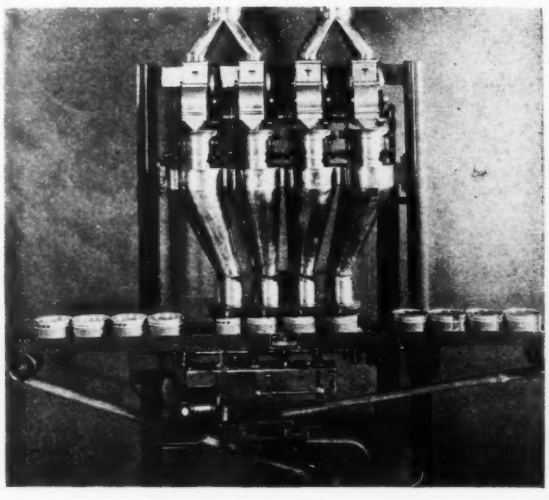
* See "Check-weighing Scales and Devices," p. 497.

1. Automatic machine which forms a continuous tube of transparent sheeting, bottom seals, fills top, seals and severs sealed packet. Photo Stokes & Smith Co. 2. Automatic net weigher with power feed for filling four packages at once. Photo J. L. Ferguson Co. 3. Bulk scale for filling ten 100-lb. sacks, deposits 90–95 per cent of contents automatically, rest of operaton being manual. Photo Amsco Packaging Machinery, Inc.

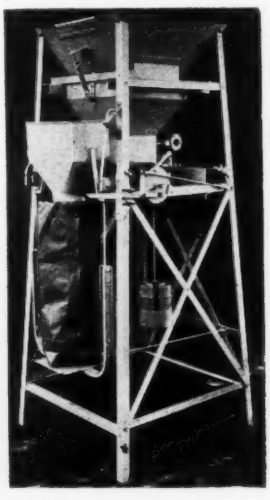
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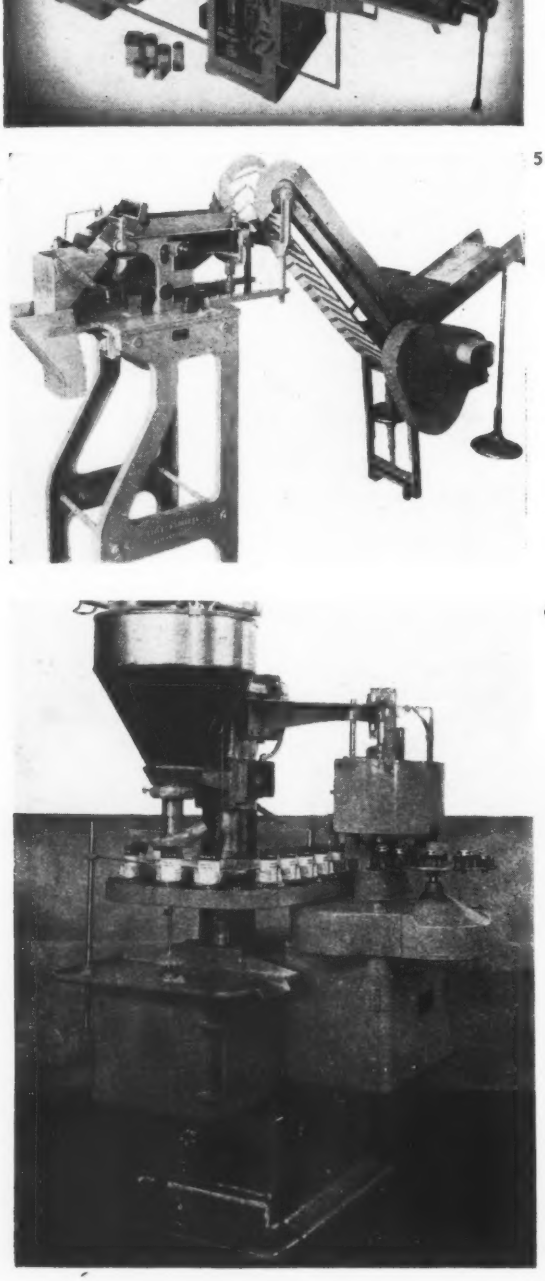


4. Four-station, automatic powder-filling machine can make complete fill at each station with total production up to 120 per minute or be arranged for bulk and dribble filling at 60 per minute. Photo Stokes & Smith Co. 5. Conveyor net-weight scale for free-flowing products. Weights to 1 lb. Photo Stokes & Smith Co.

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6

accurate weighing of non-free-flowing commodities is necessary. Typical uses include powdered sugar, cocoa, malted milk, prepared flour, etc. Speeds range from 10 per minute to 70 per minute.

A combination of gross weighing and accurate filling (i.e., measuring) is sometimes used to achieve maximum speed and high accuracy. A typical instance is found in the bag-flour packer where it is further desired to achieve a tightly packed bag. The latter factor makes straight gross weighing impractical. By resorting to a worm packer for the machine's first station, the greater part of the bag's contents can be packed in tightly, at reasonable speed, without weighing. To get weight accuracy, the filling is finished off at one or two subsequent stations by directing a fine stream of material into the bag while it rests on a platform scale.

Net-weight weighing is a system in which the package contents are weighed separately before being transferred to the package. A first essential for this type of weighing is that the product be free-flowing or at least semi-free-flowing. Obviously, this system cannot be utilized if the material is sticky and tends to build up and cling to the feed-hopper or funnel surfaces.

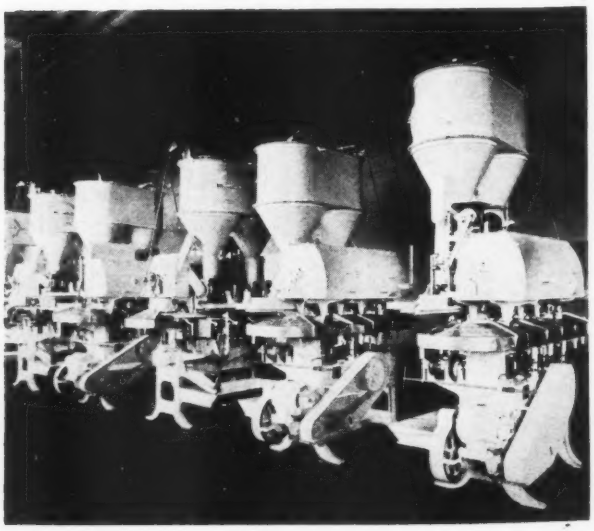
On net-weight filling machines, the hopper feeds into a bin arranged on a scale platform. When the bin has received the predetermined weight, shut-off action occurs and the contents of the bin are dumped or otherwise transferred to the package.

Net-weight weighing is utilized for such products as coffee, salt, tea, rolled oats, etc. Speeds range from 10 per minute to 100 per minute.

A wide range of container types are utilized for dry products, including folding cartons, set-up boxes, fibre canisters, metal cans, glass bottles and jars, etc. Certain basic considerations, however, affect the design of all of

6. Automatic filling and capping machine with lid transfer and feeding device. Photo F. J. Stokes Machinery Co. 7. Gross-weight scales for weighing soap flakes. Photo Battle Creek Bread Wrapping Machine Co.

7



these if they are to be successfully and economically filled on standard types of machinery. Thus, for instance, containers with narrow neck openings, which might be suitable for liquid filling, cannot be successfully utilized for packing powders.

A prime consideration in the selection of any container for powder filling involves the choice of a package with a suitably wide filling opening. Users of fibre-bodied canisters or metal cans sometimes solve this problem by filling through the open bottom end of the container and then seaming on the bottom. The limit of auger diameter is thus substantially increased and with it the potential rate of fill.

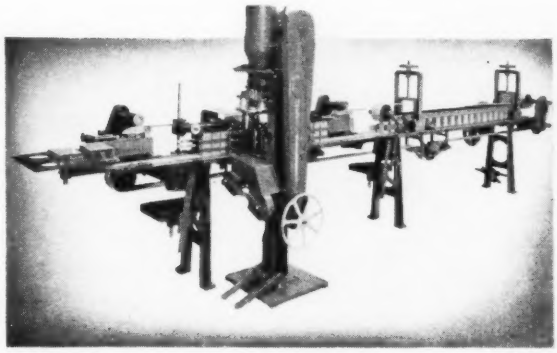
The folding carton and many types of paper bags now offered are well suited for packaging many of our widely used dry products. A number of entirely acceptable styles of each of these basic types of container are available. In either case, careful checking is suggested to determine accurately the adaptability of the product to the particular container selected. Such adaptability will concern the protection provided against leakage and contamination, the consumer's convenience and the merchandising appeal which the package can certainly be expected to provide.

Among the cartons, the sealed-end type with extended flaps is extremely popular for products which are liable to sift. Bags also enjoy wide usage in this familiar field and improved standards in construction and design now definitely assure an increasing consideration of the advantages of this type of package.

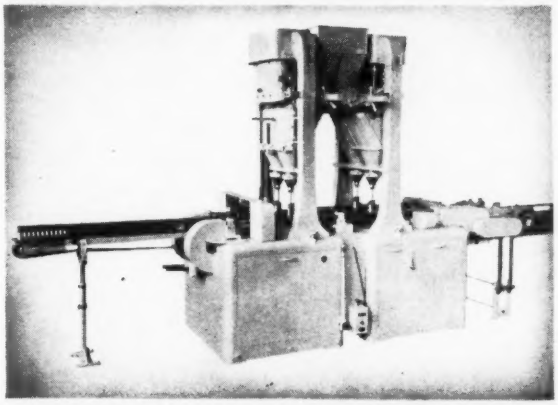
The company whose requirements are not large can install an inexpensive hook-up which will help to lower packaging costs. As need demands more production, this first installation can be replaced piecemeal by more automatic and faster units. Thus an output as low as

8. Semi-automatic carton sealer with automatic volumetric filler, fills and seals 5-oz. cartons of dehydrated egg powder. Photo Triangle Package Machinery Co. 9. Fully automatic packer-weigher fills carton by automatic packing, volume filling, weighing, or combination packing and weighing. Rate 120 packages per minute. Photo U. S. Automatic Box Machinery Co., Inc.

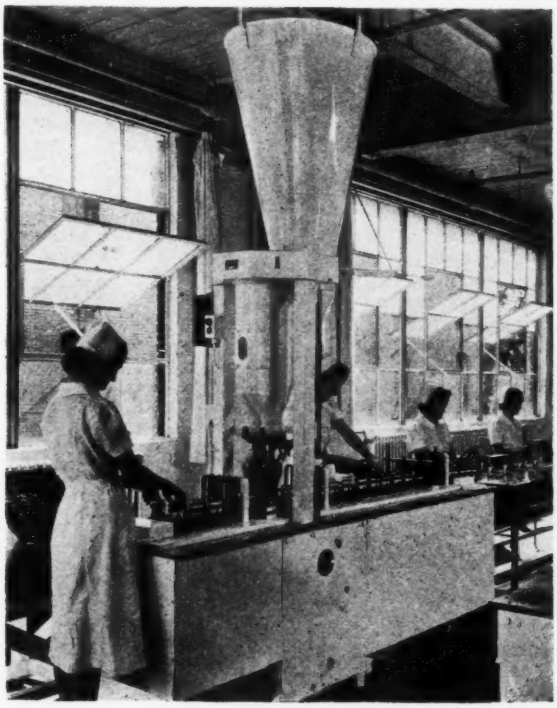
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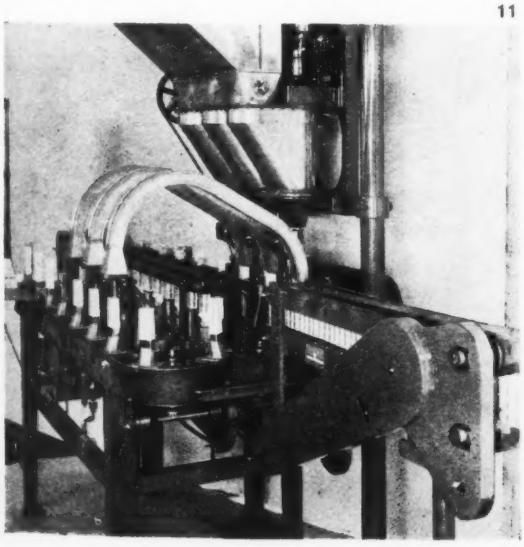


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10. Duplex automatic filler with a cap-pressing device. Photo Stokes & Smith Co. 11. Carton filler used for the filling of dry products is equipped with a bottom-folding and a glueing mechanism. Photo J. L. Ferguson Co.

11



5,000 per day justifies installing packaging equipment.

With folding cartons there are certain basic operations to consider. For some carton packages all will be needed, while for others only part are necessary.

1. Carton feeding and forming
2. Bottom sealing
3. Lining
4. Filling or weighing
5. Carton closing
6. Wrapping

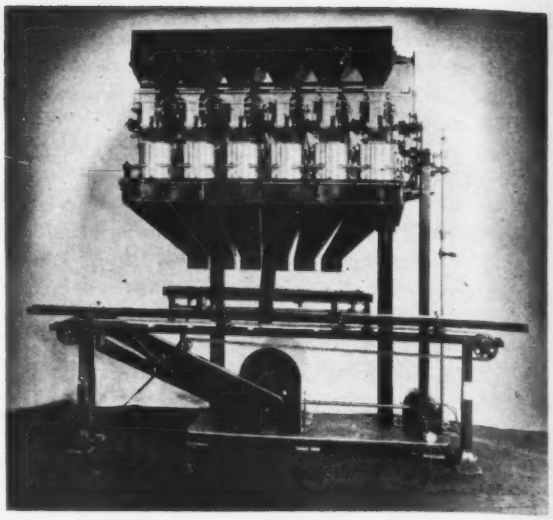
The usual practice is to handle each of these tasks on an individual unit, but in some cases it is practical to take care of several on a combination machine.

With paper bags current practice embraces automatic approaches comparable to those available for use with cartons. The extent to which these mechanical approaches are utilized is optional with the customer. A typical automatic paper bag line would provide standard types of equipment available for the mechanical performing of:

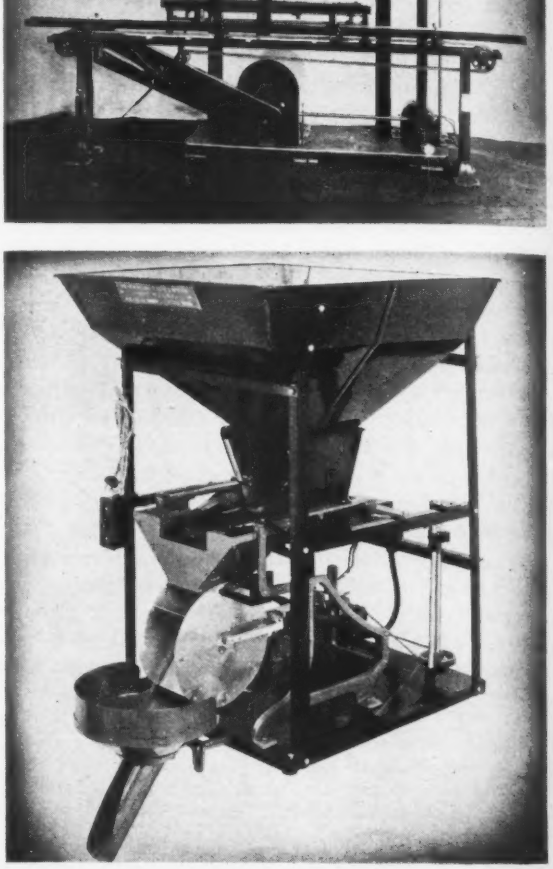
1. Feeding, opening and registering bags
2. Weighing contents and filling bags
3. Settling and sealing bags
4. Nesting and packing bags in shipping containers

These functions are handled by correlated equipment designed with a particular view toward making progressive approaches from minimum to full mechanization completely practical. Photographs show typical plant installations and some of the more widely used equipment for the packaging and general handling of paper bags.

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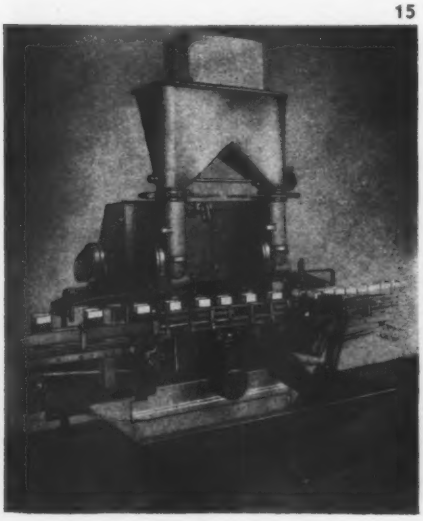


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12. Six unit net-weight scale for filling corn flakes, etc. Photo Battle Creek Bread Wrapping Machine Co. 13. Hopper-fed machine for filling and net-weighing dry products. Photo Amsco Packaging Machinery, Inc. 14. Automatic net weigher with shaker-type conveyor for filling, weighing and packing coffee in 1-lb. cans at 60 per minute. Photo Triangle Package Machinery Co. 15. Two-scale gross-weighing filler, fully automatic, for free-flowing and non-free-flowing materials. Photo Pneumatic Scale Corp., Ltd.

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14



Check-weighing scales & devices

A wide variety of devices has been developed to permit packagers to check and control the accuracy of fill of containers. These fall into three general groups listed.

In the selection of packaging and check-weighing scales, one of the essential things to consider is the proper scale for the particular job. A scale built with sufficient sensitivity for weighing 10-lb. packages would not have the necessary sensitivity for 1-oz. or 3-oz. packages. The operation of the packaging and check-weighing scale should be automatic, so that the operator can easily tell when the correct weight is reached. Many scales offer quite a wide indicator travel per ounce, which means that the weight tolerance of the package can be kept down to the mere fraction of an ounce.

Just as care must be exercised in the selection of a scale to fit the particular capacity weighing job, so must the same care be taken in seeing that the scale has been designed to be used under the working and atmospheric conditions of the plant in which it is to be used.

Check-weighing scales

For smaller packages ranging from a fraction of an ounce up to 100 lbs., the balance type of scale is most commonly used for check-weighing. The development of an over-and-under weight indicator has made the balance type of scale especially well adapted for production and check-weighing of packages up to 100 lbs. This type of scale can be built to a high degree of sensitivity, is not seriously affected by machinery vibration and weighs correctly in any normal out-of-level position. The scale is simple in structure, does not require a great deal of service and simplifies the process of weighing.

There are a number of different models and types of over-and-under weight balances designed and constructed to take care of various items and operations.

In all of these various types, the scale dial shows the zero reading, which indicates the exact weight point. The dial may also be provided with weight graduations or tolerance marks. Where graduations are used, the operator or inspector is able to determine the amount of weight error in the package, thus affording a guide in adjusting the filling equipment. If the scale is used for checking different commodities, the dial may be equipped with adjustable mechanical tolerance markers.

For check-weighing larger packages, some type of beam scale or a dial scale is generally used. A recent development, which tends to make the beam scale well adapted as a packaging scale, is that of an over-and-under weight indicator.

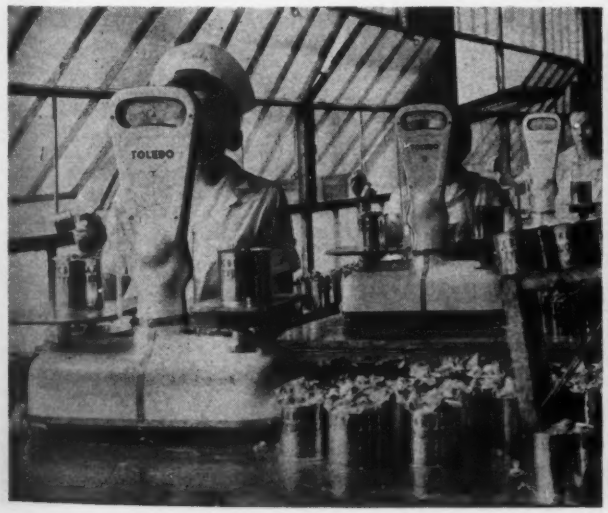
In hand filling, it is of course essential that all packages be weighed. Automatic weighing fillers are subject to occasional variations for reasons which are difficult to control. Periodic check-weighing (every 10th or 100th package, as need indicates) is, therefore, usually resorted to as a check of the continuing accuracy of fill.

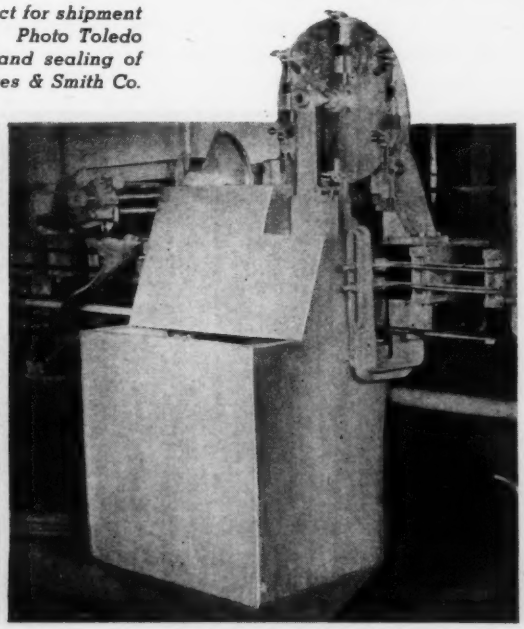
Automatic weight-sorting equipment

Where need requires, it is sometimes found desirable to utilize automatic equipment to sort packages by weight.

One type which has achieved fairly wide usage is set into the conveyor line so that packages are passed over a weighing pan. Each package is momentarily lifted

1. Battery of Toledo Gravitygrams check-weighing meat product for shipment to Russia. High unit value makes accurate weight important. Photo Toledo Scale Company. 2. This automatic machine for the filling and sealing of cartons is equipped with circular outage detector. Photo Stokes & Smith Co.





from the conveyor chains for weighing. On the opposite end of the scale beam, a pan carries a standard weight container against which each successively produced package is to be tested. Containers which balance or over-balance carry straight along the line, containers of insufficient weight are automatically shoved off.

Another type of sorting scale is used to examine packages prior to filling rather than filled containers.

Articles to be check-weighed are fed to the scale which pushes aside the under-weights or the over-weights to pass on to the filling machines. Since light packages are separated from heavy containers, it is possible, at a later time, to reset the scale, make compensating adjustments on the filling machines and thus to utilize both.

One company has developed a new method of accurately classifying articles by weight during manufacture or packaging by means of electronic classification. The unit requires no synchronizing with the feeding conveyor, uses no photo cells or mercury switches, and operates at unprecedented speed and accuracy. Compact, single unit design facilitates ease of installation. Its operation is unique in that weights are taken at their dynamic value, thus eliminating the mechanics normally required to place the commodity on the scale, release the weighing mechanism and again put the commodity into motion. Packages or articles to be weighed are uninterruptedly passed over the sensitive weighing unit and are automatically diverted into conveyor channels corresponding to their weight classification.

The material-labor ratio of many commodities makes it uneconomical to trim after packaging, and in such cases it is usually desirable to reject only the underweight packages. More costly commodities packaged volumetrically warrant hand trimming of overweight packages and usually are grouped into three classifications: underweight, correct weight and overweight.

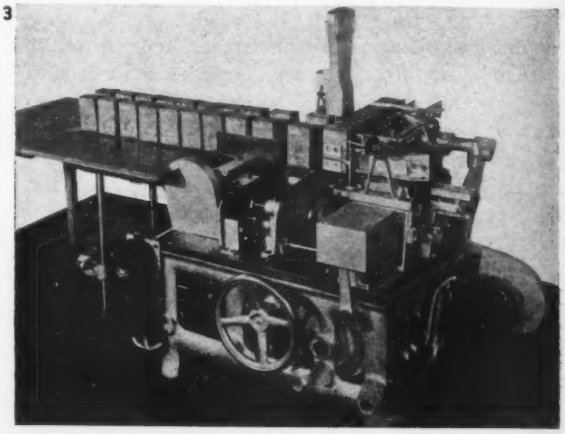
Volume outage detectors

Perhaps the simplest of checking devices—in principle, if not necessarily in construction—are the so-called outage detectors which are used to determine the level of fill of dry product cartons. These are of various types—straight line and rotary—all using the principle of the mechanical finger which is inserted into each package. Should the finger find itself able to descend further into the body of the package than a correct fill would permit, a mechanism is set in motion which throws the package off the line. Straight-line detectors are located at the delivery end of high-speed weighing machines and check packages as they leave these units. One type automatically stops the weighing machine if packages pass through not filled to the correct height.

Another type utilizes a circular disc, with hanging members set vertically above the packages on the conveyor line. If the material is below the desired height in the container, contact will not be made with the hanging member and a throw-out switch pushes packages off the line.

3. Automatic check-weigher rejects over- and underweight packages. Photo Arenco Machine Co., Inc. 4. Conveyor unit with automatic weigher classifies articles by weight during packaging, facilitates handling speed. Photo Exact Weight Scale Co. 5. Predetermined weight scale with over-and-under chart and poise locks to prevent movement during operation. Photo Toledo Scale Co.

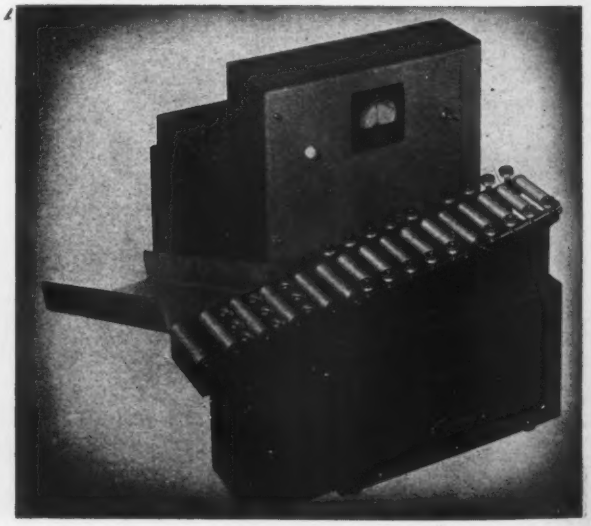
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1. Versatile machine which performs the operations of rinsing, washing and drying bottles. Note trays permitting use for a wide range of bottle sizes. Photo U. S. Bottlers Machinery Co.

Bottle-cleaning equipment

To prevent any contamination of their products and to comply with food and health laws, manufacturers find it necessary to clean bottles prior to filling. Those using all new containers desire to remove lint, dust and any glass chips that may enter the container between the time of its manufacture and the time of its use in the packaging plant. Those using a returned bottle—as in the milk and beverage industries—of course find thorough washing and sterilizing of such containers an absolute essential. Cleaning equipment is of three general types: air cleaners, rinsing machines and soaking, rinsing and washing machines.

The two former types are recommended only for the thorough cleaning of new glassware not requiring sterilization at the point of filling. When second-hand or returned bottles are being used, only a thorough soaking and washing in sterilizing solutions, followed by a careful drying, can be recommended.

Air cleaning

Where glassware comes directly from the factory, cleaning by compressed air has been found satisfactory in numerous plants, particularly provided the glassware has not been exposed—outside of closed shipping containers—to grime or grease.

Air cleaners of both hand-operated and automatic types are available. In the non-automatic type, the operator places two bottles at a time against air tubes, arranged to provide a blast of air whenever the pressure of the bottle necks is applied. From 60 to 80 lbs. of compressed air pressure is utilized and dirt, lint and grease are thus literally blown out of the bottle. Such machines can be operated at a speed of from 30 to 40 containers per minute, depending on the skill of the operator and the size of the container.

Automatic machines of various types are also available. In some instances, rotary machines very similar to bottle-filling machines are utilized, receiving the bottles directly from a conveyor and cleaning them while in upright position. They are discharged, one by one, back on to the conveyor, by means of a star wheel.

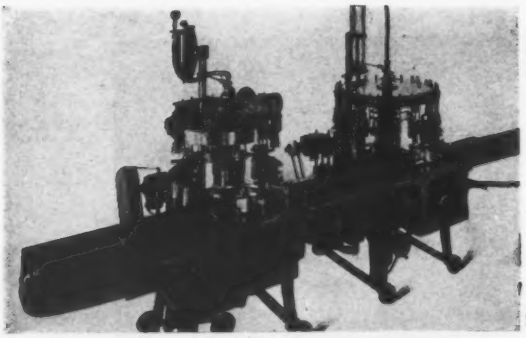
Another type takes bottles, inverts them for cleaning, replaces them, clean, in upright positions—all continuously—and discharges them by means of star wheel arrangement.

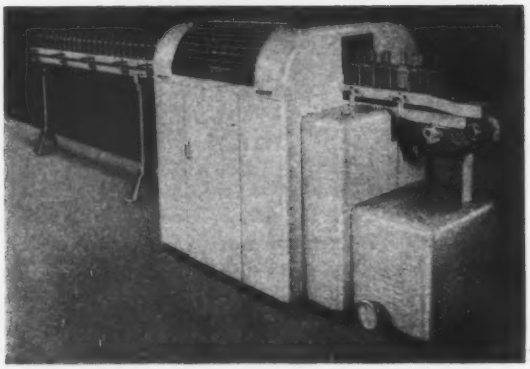
Another type of machine receives a group of bottles from the conveyor on to a barrel-like holding device and then proceeds to invert these bottles over air nozzles. Cleaning is thus accomplished while the bottles are held in inverted position. While one set of bottles is being cleaned, the preceding set, at the opposite side of the drum, is being returned to the conveyor and a third set being received, immediately thereafter, by the drum.

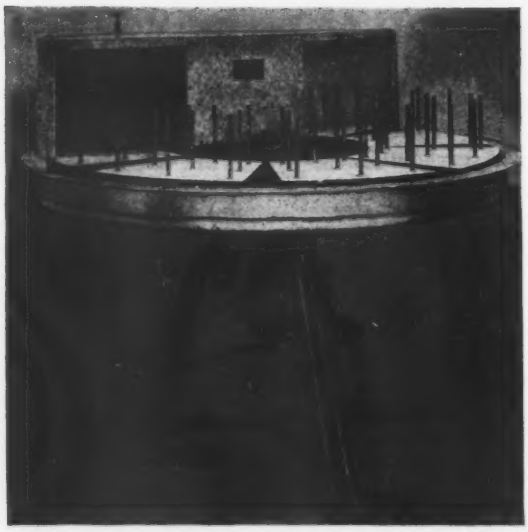
Air cleaning equipment is sometimes incorporated as an integral part of a bottle-filling machine.

Bottle rinsers

Bottle rinsers utilize a spray of water—sometimes heated and sometimes including sterilizing solutions to rinse both the inside and the outside of inverted containers. Some of the rotary table type consist of a large number of spouts mounted on a rotary table. The







operators invert bottles over these spouts which then pass under a hood where interior and exterior sprays are applied. Machines of essentially similar principle are also manufactured using a straight line conveyor or a chain conveyor, designed to carry one or more rows of bottles through a rinsing hood where both interior and exterior rinsing is performed.

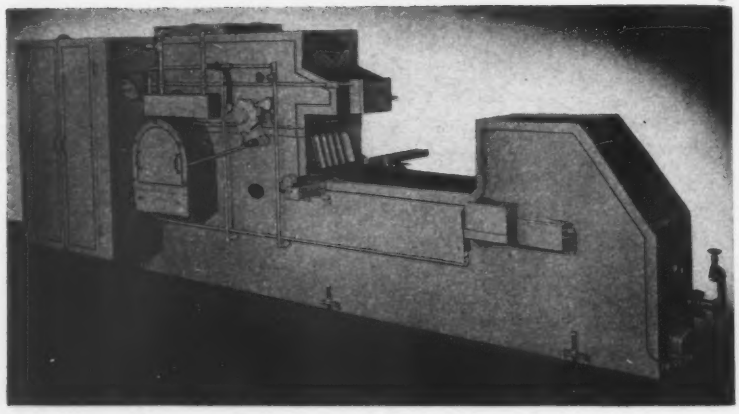
Soaking and washing machines

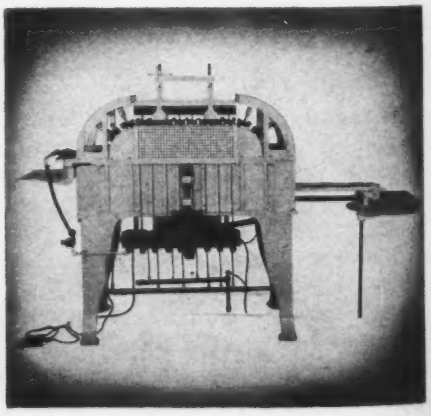
Soaking and washing machines were designed to meet the far more complicated cleaning problems involved in the use of multi-trip containers. Such containers frequently require the removal of an old, stained or torn label. They have often been used—while in the field—to hold products ranging from kerosene to fats. They have had opportunity to collect every sort of contamination—germs, dirt, grease and grime—and thus require the most effective form of thorough cleansing and sterilization.

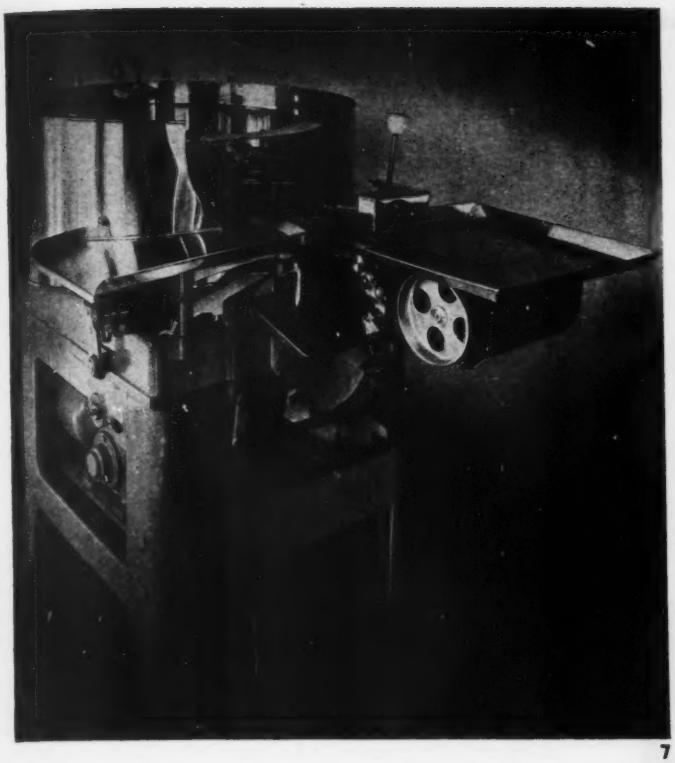
Machines of this sort usually first rinse the bottle to flush out loose dirt, flies, etc., and to pre-heat the bottles for the high temperature solutions in the following processes. Soaking in hot alkali solutions then follows to remove effectively labels, adhesives and all forms of dirt deposits. Frequently brushing devices for both interior and exterior of bottles are included as an integral part of the machine. The final step consists of rinsing of both interior and exterior, to remove all cleaning solutions and then draining and, in some instances, drying.

Machines vary in size to meet varying production needs and use chain belts equipped to hold anywhere from one to twelve or more bottles per link. Feed and discharge may be automatic and directly off a conveyor,

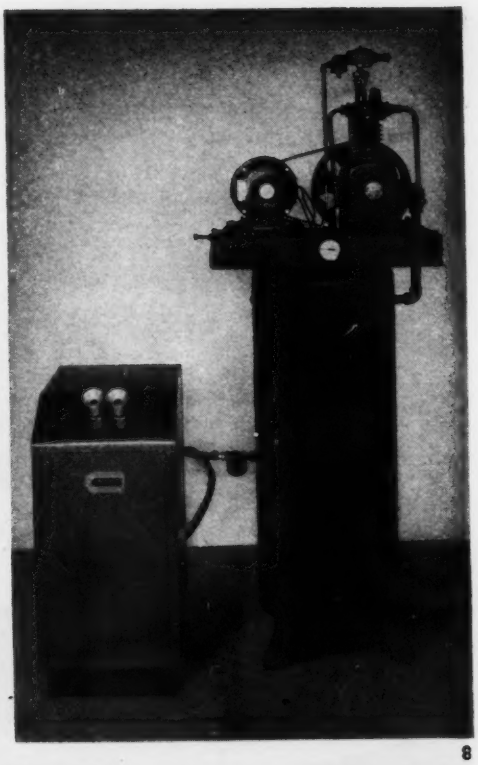
2. Rotary air cleaner used in conjunction with rotary vacuum bottle filler. Photo The Karl Kiefer Machine Co. 3. Fully automatic straight-line air cleaner. Bottles are inverted six at a time over cleaning heads. Photo Pneumatic Scale Corp., Ltd. 4. Rotary bottle-washing table. Bottles are placed on table and removed by hand. Photo F. J. Stokes Machine Co. 5. Five-wide automatic bottle washer for cleansing returned bottles. Photo Liquid Carbonic Corp. 6. Automatic ampule washer which feeds, cleanses and discharges ampules, tubes and other similar glass containers. Photo PerfeKtum Products Co.





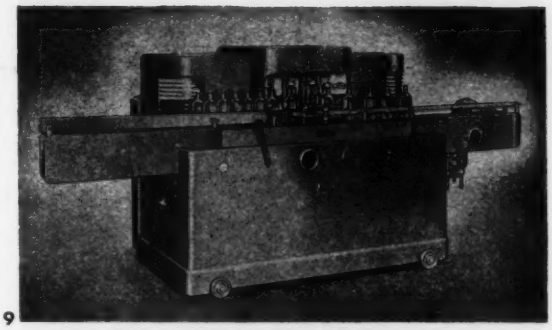


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7. Automatic ampule washer and sterilizer utilizes rotary motion. Photo The Lakso Co. 8. Semi-automatic, inverted-bottle air cleaner with compressor. Photo Pneumatic Scale Corp., Ltd. 9. Automatic rotary bottle cleaner. Containers are inverted over air blast. Photo The Karl Kiefer Machine Co. 10. Automatic air cleaner, rotary type, for bottles. Photo U. S. Bottlers Machinery Co.



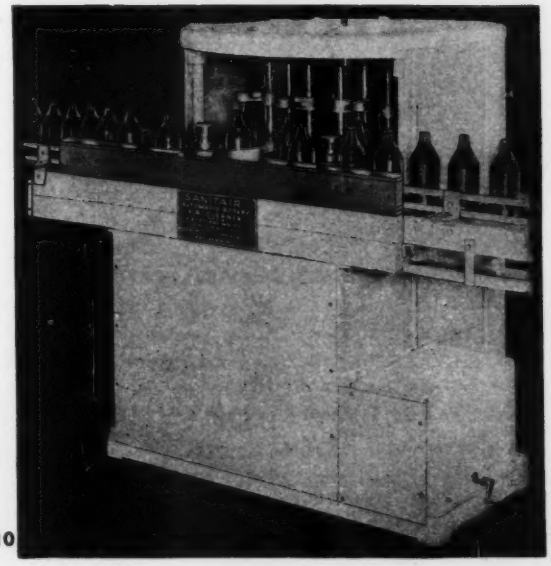
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or semi-automatic by means of magazine feed or hand feed in some instances.

Production speeds vary with the width of the machine, i.e., the number of bottles held per link of chain or belt, and with the size and type of container. Thus an essentially identical machine designed with a four-bottle-wide belt will have a capacity of from 24 to 32 bottles per minute, whereas an eight-bottle-wide belt machine will have a capacity of from 48 to 64 bottles per minute.

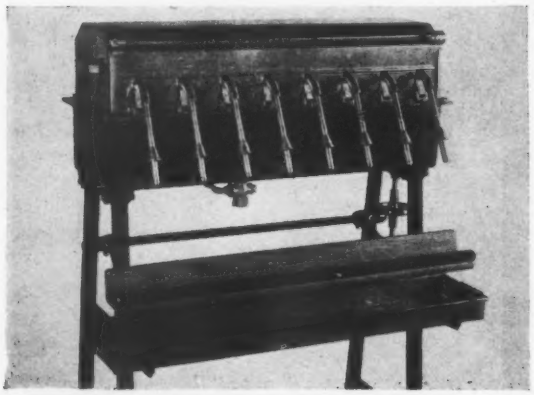
Automatic ampule washers

Another development has been the ampule washer. Models are available which automatically feed, cleanse and discharge ampules, tubes and other similar glass containers. The operator of this machine places the unclean tubes or ampules on the loading channels. After that they are automatically aligned with the washing needles, placed thereon and moved through successive cleansing, washing and drying operations. The ampules are subjected to the action of a cleansing substance throughout eight stations, discharged on a conveyor and are then ready for the autoclave or for the filling and sealing operations. The operation is continuously intermittent, allows enough dwell period at each station to insure washing and drying without mixing of the fluids.

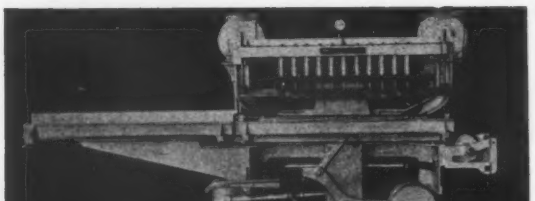


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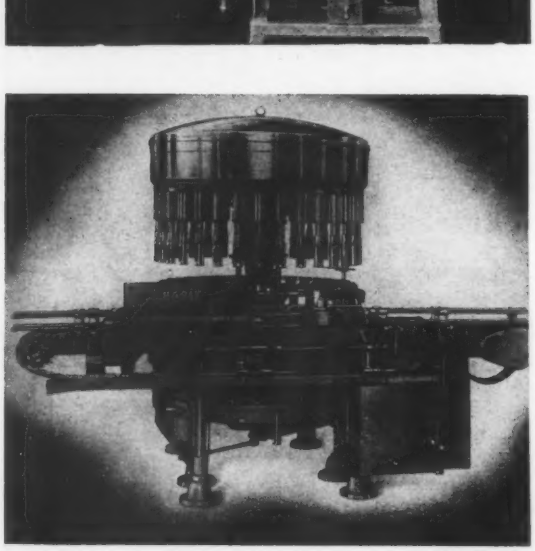
Filling liquids & pastes



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1. Gravity-type liquid filler with eight filling spouts. Photo Scientific Filter Co. 2. Semi-automatic vacuum filler for bottles and cans. Photo Pneumatic Scale Corp., Ltd. 3. Thirty-two valve automatic feed and discharge rotary filler. Photo Horix Mfg. Co. 4. Detail of single-unit packer for filling pastes. Table moves on vertical frame, gives greater packing capacity. Photo Stokes & Smith Co. 5. General purpose filling machine to be used in the filling of thick liquids and pastes. Photo F. J. Stokes Machine Co.

Equipment for the filling of containers with liquids or pastes can generally be divided into two broad general classifications:

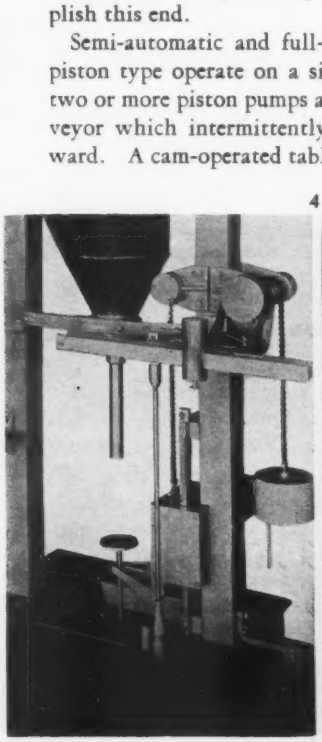
1. Metering machines—which deliver to the container by:
   (a) A measured volume.
   (b) A measured weight.
2. Constant-level machines—which fill the containers to a uniform height as measured from:
   (a) The bottom of the container to the liquid level at the top.
   (b) The top of the container to the liquid level.

Metering machines are used principally for viscous or semi-liquid products. The constant-volume type consists basically of an accurate pump of either piston or rotary impellers and is obtainable as hand operated, semi-automatic or full automatic equipment.

The hand-operated units are generally constructed with a piston pump, a hopper in which is loaded a batch of the material to be filled and a spout to which the operator presents the containers in time with the stroke of the piston. On some products, it is necessary to keep the tip of the spout immersed in the fluid as it is ejected into the container, thus eliminating air pockets. In the hand-operated machines, the operator is relied upon to lower the container away at the proper speed in order to accomplish this end.

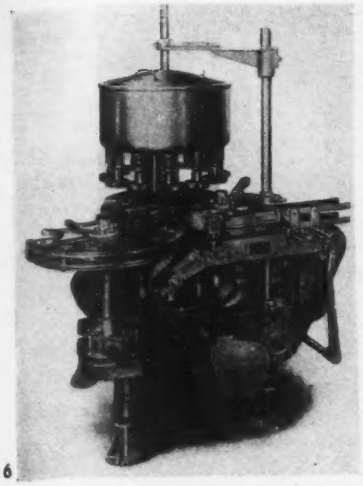
Semi-automatic and full-automatic machines of the piston type operate on a similar principle, except that two or more piston pumps are utilized along with a conveyor which intermittently carries the containers forward. A cam-operated table raises the containers at the

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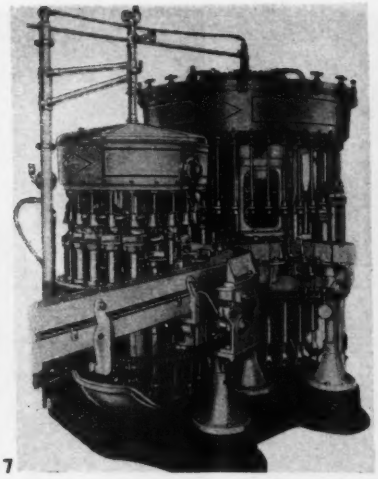


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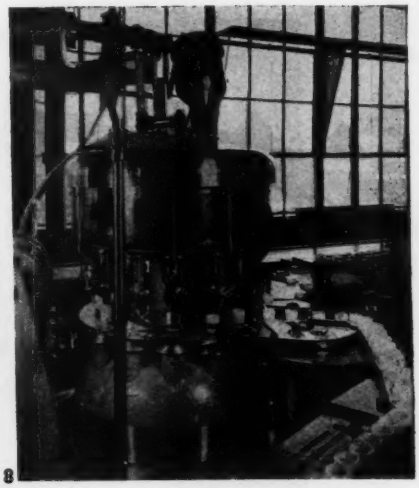




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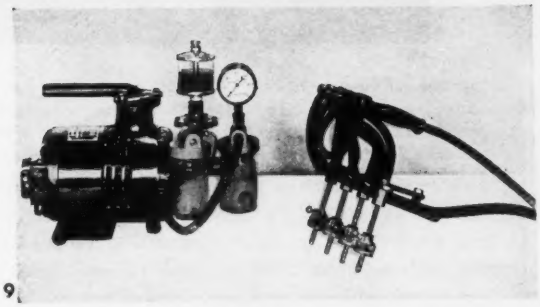
6. Twelve-valve automatic rotary filler, gravity type, for filling soups, syrups, etc., in open-top cans. Photo Horix Mfg. Co. 7. Forty-spout liquid low pressure filler with 20-spout syruper, used in soft drink field. Photo Liquid Carbonic Corp. 8. Predetermined level filler for filling of free-flowing products. Photo Food Machinery Corp.

filling station and lowers them away in timed relationship with the piston stroke. The containers can be automatically discharged onto a conveyor for subsequent packaging operations.

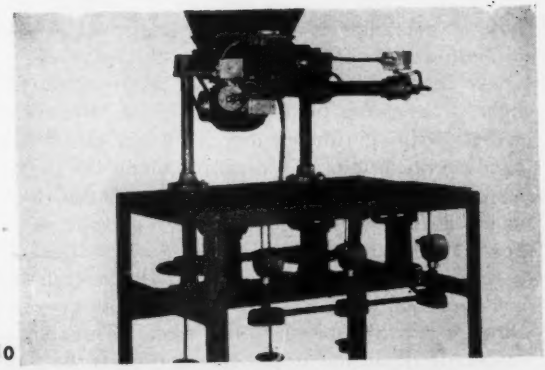
Machines are also available of the full-automatic, constant-motion, rotary type. This type of equipment can be hand fed by an operator placing empty containers on the trays of the machine. This construction is usually recommended where there is a wide variety of shapes and sizes to be handled. These machines can also be automatically fed and are well adapted to conveyor line operation where there are previous and subsequent operations to be performed. For this purpose, a star wheel is utilized and the containers are removed from the conveyor thereby and automatically returned to the conveyor after the filling is completed.

There are two general constructions of the rotary-type machine. In one there is a series of piston pumps mounted above and rotating with the containers, so that each stroke of a piston fills the container below it. In the other there is a pump of the rotary-impeller or piston type, depending upon the product to be handled, and a valve head arranged so that the entire discharge from the pump is ejected into one, and only one, container at a time. In recent years, this type of equipment has been greatly improved so as to give greater speed, cleaner filling and a wide capacity range with minimum changeover time. There have also been added no jar—no fill and other safety devices, so as to render the equipment foolproof. The rotary-impeller pump has the distinct advantage of a constant velocity of material flowing through it in one direction, so as to minimize its wear and thereby indefinitely hold its accuracy.

Constant-weight-measuring equipment contains a scale as an integral part of the machine. As the container is



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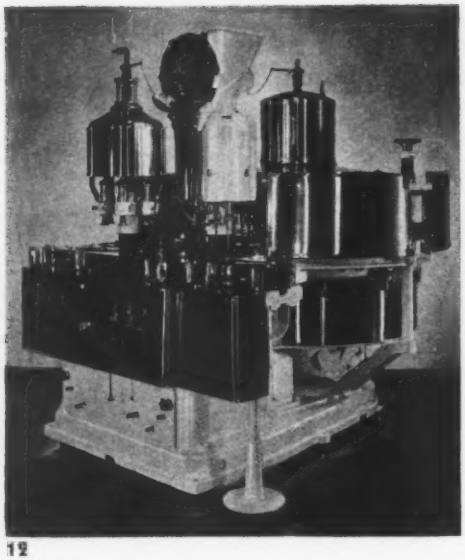


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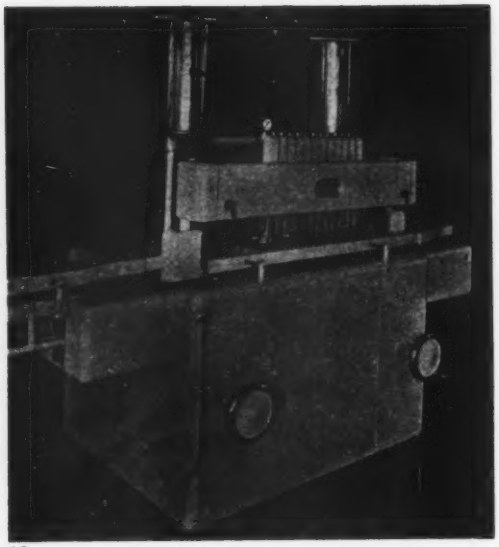


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9. Portable vacuum-type filler with four-valve filling heads. Photo Horix Mfg. Co. 10. Multi-head paste filler for hot and cold semi-plastic products. Photo The Vol-U-Meter Co. 11. Straight-line semi-automatic vacuum filler. Photo U. S. Bottlers Machinery Co.



12



13

12. Syruper-filler-crowner used for bottling soft drinks. It is a rotary machine with 6 syrupers, 40 filling valves, 6 crowning cylinders, produces 128 6-oz. bottles per minute. Photo Crown Cork & Seal Co. 13. Automatic vacuum filler for bottles and cans, equipped with variable speed drive permitting adjustment to other machines in the line. Photo Pneumatic Scale Corp., Ltd.

filled to a point where it is equally as heavy as a predetermined weight placed on the other platform, the balancing of the scale causes the filling valve to be tripped and the flow then stopped. These units are principally of the hand-operated type and generally give no greater speed than an operator can obtain with a hose with nozzle-valve, but offer the distinct advantage of clean and accurate filling.

The constant-level equipment is principally used for light, free-flowing liquids. The siphon filler was the earliest design in this category and is still used for some hand-operated units. In these machines, the container is filled until the liquid level therein is the same as that in the float-controlled supply tank. There is no overflow to be handled with this method.

Direct pressure machines require that the neck of the container be sealed, usually with a rubber stopper through which passes the filling stem. This stem contains both liquid and air passages so that, as the product flows through under a gravity head pressure which may vary between three and fifteen feet, the air is permitted to escape. When the container is filled, the air escapes by the passage provided in the filling tube, the liquid then begins flowing out through that passage, but, since the opening is small, it runs at a greatly reduced speed. This type of equipment is faster than the siphon units and is obtainable in all sizes from hand-operated to full-automatic.

Drip and the filling of defective containers can be prevented by the use of a variant of the direct pressure construction known as the "gravity vacuum." In this design the supply tank, mounted above the filling tubes, is kept under vacuum, so that vacuum must be created in the container before the liquid can be permitted to flow into it by gravity.

In full-automatic equipment, the straight vacuum, the gravity-vacuum and gravity principles are frequently used. In the vacuum construction, the float-controlled supply tank is mounted below the filling tubes. The containers are sealed, as in the direct pressure units, and the air withdrawn from them. The reduced pressure thus produced causes the liquid to be drawn into the containers, the overflow going out through the air tubes just as in the pressure machines. The liquid is separated from the air by an automatic trap, the liquid being returned to the supply tank and the air going out through the vacuum pump. These machines are available in all sizes from hand-operated units to completely automatic.

Into full-automatic liquid filling equipment there have been incorporated, in the last few years, many safety devices which make for smooth, top speed operation with a minimum of stoppage. Machines have devices guaranteeing protection against damages otherwise resulting from carelessness on the part of the operator or from choke-neck or misshapen containers or even the stopping of other machines in the line.

Operating speeds of filling machines of the automatic varieties have been substantially speeded up during the past few years, machines now in operation in some plants working at speeds of as high as 300 14-oz. bottles per minute. Of course, speed—while of great importance—is but one of a number of considerations by which a filler should be judged. Among other important factors are ease of adjustability and ease of cleaning. Machines for foods and chemicals are often made with stainless steels or other reaction-resisting materials on all parts coming into contact with the material being filled.

Semi-automatic units are generally of the straight-line type through which the containers are advanced intermittently. Full-automatic equipment of both the straight-line and rotary types is obtainable.

Capping & sealing equipment

Machines are available for applying screw caps, crowns, corks and vacuum caps to containers at varying rates of speeds and under a wide range of differing operating conditions. Such machinery varies from the simplest hand cappers to high-speed fully automatic equipment, operating on conveyor lines in conjunction with filling and labeling and cartoning machines.

Screw and turn-on caps

The application of the screw-cap closure is not as difficult a problem as it at first appears. When the cap is properly designed so that the lead threads readily follow the thread on the glass, thus preventing any tendency to cross thread, and the liners are glued into the cap or attached in a satisfactory manner so as to prevent their falling out of the cap, it is possible to employ automatic equipment in the application of these closures.

There are several types of machines available for applying turn-on caps. On some of these it is only necessary to dump the caps in a hopper, from where they are systematically sorted and fed to the machine in relative coördination with containers received from the filler. On others, generally referred to as semi-automatic cappers, it is necessary to start the cap on the container. Regardless of the type machine employed, the caps must be applied with the proper tension so that a perfect seal is made both with the top of the bottle and the cap liner.

Hand-capping machines

Machines made for hand capping are, in many cases, used where production requirements are so small that the tendency is to continue with the old hand operation. For those manufacturers whose requirements are small, the adoption of at least a hand-tightening unit is recommended. This unit can be adjusted so that every cap will be applied to the proper tension in order to insure a proper seal and still be easily removable by hand.

Semi-automatic machines

Machines which are semi-automatic are of the same general construction and size as the fully automatic. The cap-feeding device, however, is omitted and the cap started on the container by hand. It is installed in the production line the same as the fully automatic and occupies the same space as the automatic machine. It has a feed conveyor and a discharge conveyor and the containers are fed and discharged automatically.

The smallest semi-automatic machine is generally a single-head machine designed for operating at capacities from 1800 per hour to about 2700 per hour. In order to obtain a larger capacity, it is necessary to employ a machine using a number of spindles rather than a single head. These units are designed to possess a capacity of from approximately 50 containers per minute to 120 or more. They are usually of the rotary type and are in practically all cases the same machine as the fully automatic, except for the omission of the automatic cap-feeding and applying mechanism.

Another variation of the semi-automatic capper is the type which uses a belt cap feed on to which the operator simply feeds the caps. From that point on, operation is completely automatic. This method is often used where closures are of a type not suited to automatic sorting and feeding.

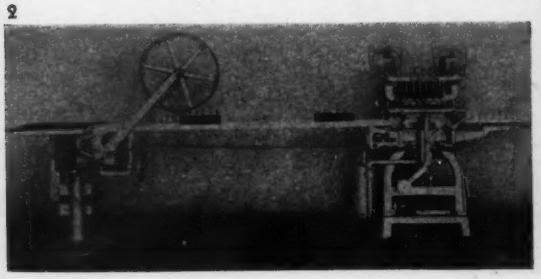
The semi-automatic unit can be readily changed from one size container and cap to another and the cost of attachments for the different containers is not exceedingly high. On the fully automatic machine, a change from one size cap and container to another requires a longer period of time and the attachments, of course, are much more costly.

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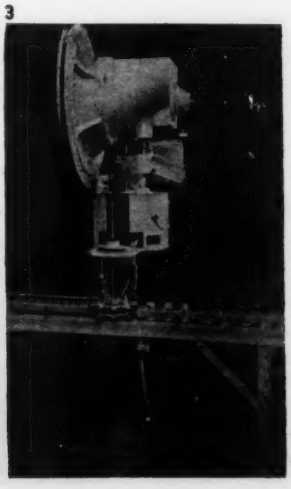


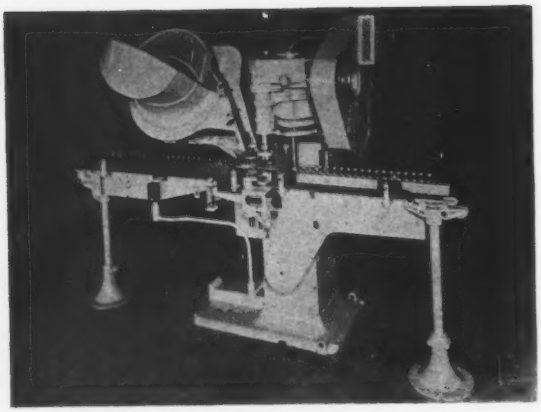
1. Full-automatic, four-spindle rotary capper. Photo Consolidated Packaging Machinery Corp.
2. Corking wheel unit on discharge conveyor of filling machine. Photo Pneumatic Scale Corp., Ltd.
3. A fully automatic capper sorts, feeds and applies square cover assembly to can bodies. Photo Consolidated Packaging Machinery Corp.

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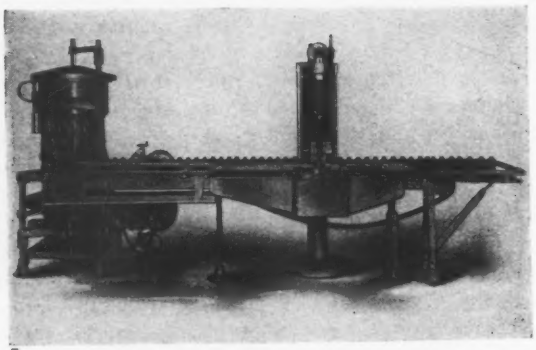


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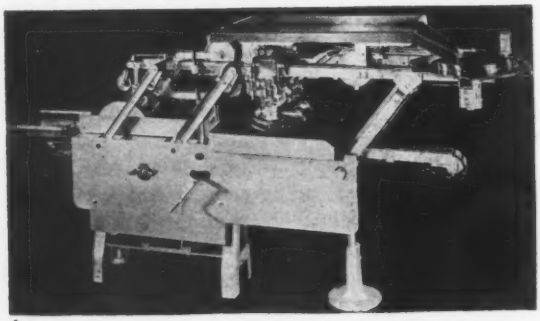




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Fully automatic machines

When it comes to larger capacities, or outputs, machines which are fully automatic are sometimes found to be far more desirable inasmuch as their greater efficiency will considerably reduce the packaging production costs.

Automatic units are most profitably adapted to those production lines operating at a capacity of 45 or more containers per minute. There are, however, many instances where a steady production of 35 to 40 containers per minute is needed and sizes are suited to automatic production. In such cases, a full-automatic, single-head or slow-speed, multiple head unit may be desirable.

A recent development replaces the familiar hopper with a worm feed device. Since this eliminates the necessity of agitating and jumbling large masses of caps in a hopper, it permits the handling of delicate types which could not previously be handled automatically and particularly those closure types where the height exceeds the diameter.

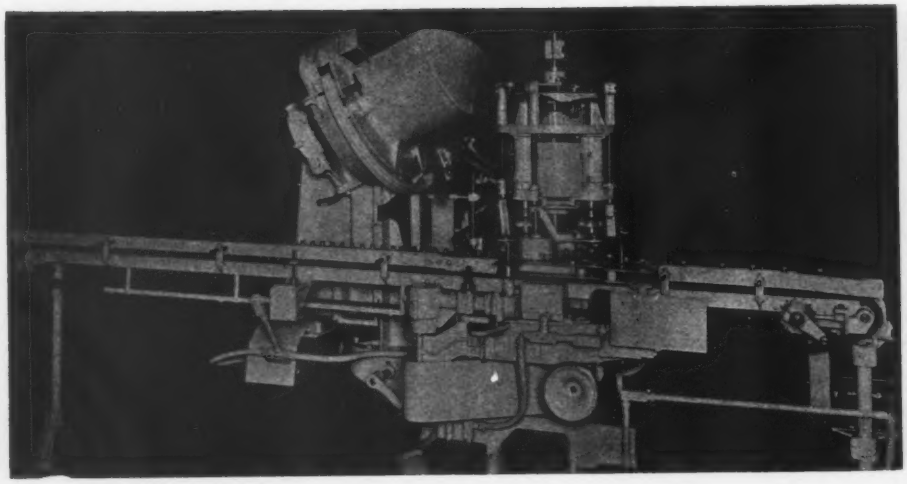
Crowns and corks

When plain or flanged corks are used, the capping problem resolves itself into one of inserting the cork into the neck, rather than turning a thread. Such insertion is, in the vast majority of cases, done in part or in whole by hand. The most familiar mechanical aid is the corking wheel conveyor, which consists of a section of belt conveyor with a wheel of fairly large diameter suspended above it at the height of the bottle top. Operators start the corks as the containers pass down the forepart of the conveyor and the movement of the belt then forces the bottles, under the corking wheel.

Another type of corker substitutes an endless belt,

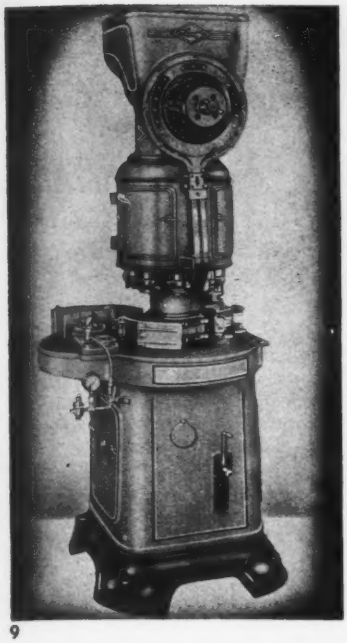
4. Single-head, full-automatic capper. Photo Pneumatic Scale Corp., Ltd. 5. Semi-automatic screw capper with hand-fed, automatic-discharge, rotary bottle filler. Photo Horix Mfg. Co. 6. Vacuum-pry-off cap sealer for jars 3 to 12 in. high, 1 to 8 in. in diameter. Photo Crown Cork & Seal Co. 7. Four-head, full-automatic rotary capper. Photo Pneumatic Scale Corp., Ltd. 8. Semi-automatic screw capper. Photo Scientific Filter Co.

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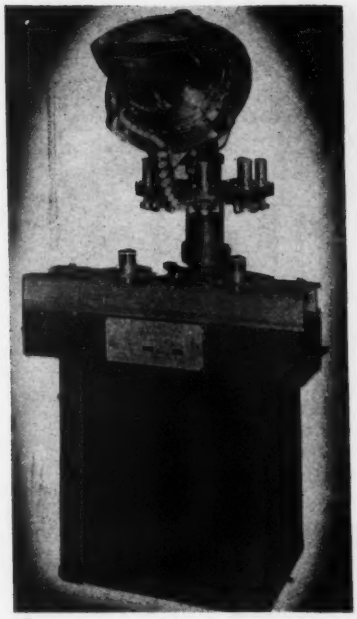


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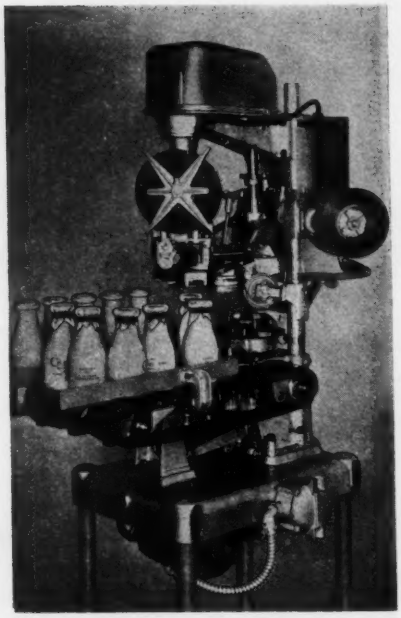




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9. Ten-head rotary crowner for carbonated beverages. Photo Liquid Carbonic Corp. 10. Full-automatic rotary corker for flanged corks. Photo U. S. Bottlers Machinery Co. 11. Milk-bottle hooding machine forms, applies, heat seals protective caps. Photo Package Machinery Co. 12. Sealer handles 300 bottles a minute, adjusts to gallon size, synchronizes with filler. Photo Aluminum Co. of America. 13. Automatic cottoner inserts wadding in pill bottles. Photo Lakso Co.

running over two pulleys, for the corking wheel. A rigid metal plate behind the slanting lower portion of the moving belt forces the corks firmly and evenly into the neck of the containers.

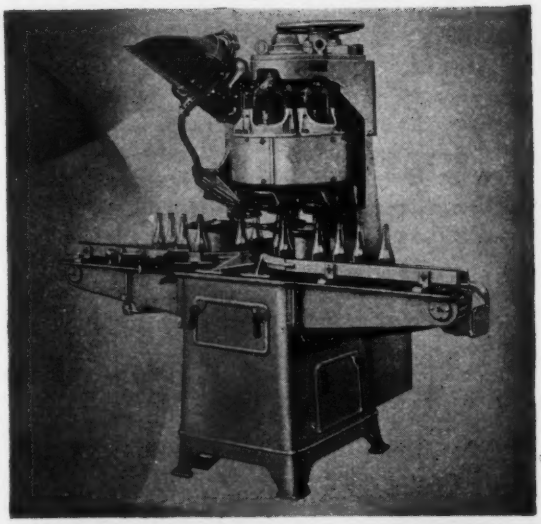
Crown caps are frequently applied by equipment forming an integral part of bottle-filling machines. However, separate rotary crowners of fully automatic type are available. These are very similar, in feed and general structure, to rotary turn-on closure cappers, except that they substitute a crown-forming pressure for the turning action of the ordinary capper.

Hand and semi-automatic devices for applying crown caps, milk bottle caps, foil and paper hoods for milk bottles and many other specialized types of closure or super closure are also available. The basic principle of application varies very little, however, from those described in the foregoing discussion.

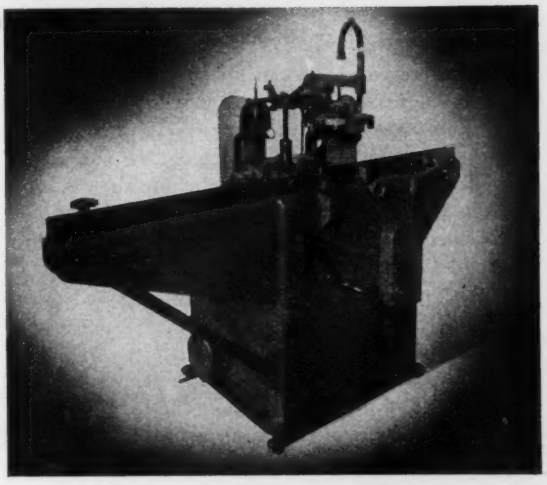
So-called roll-on caps are applied by rotary automatic machines which position the unthreaded cap on the bottle and hold it thus while revolving rollers form the cap metal to the shape of the bottle thread.

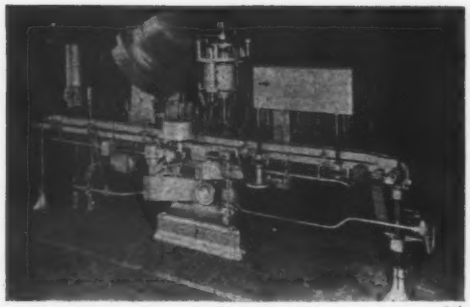
Fully automatic corking units have been devised recently for a number of special applications. In one such machine, corks are placed in the correct position in the corking head for driving into the bottle neck by a positive air-pressure-feeding device. Corks are hopper fed into a channel that directs each cork to the correct position and register before insertion in the bottle neck. The

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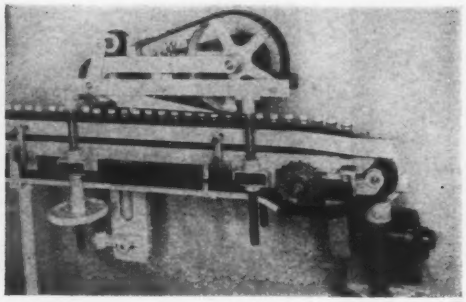


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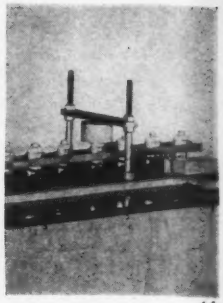




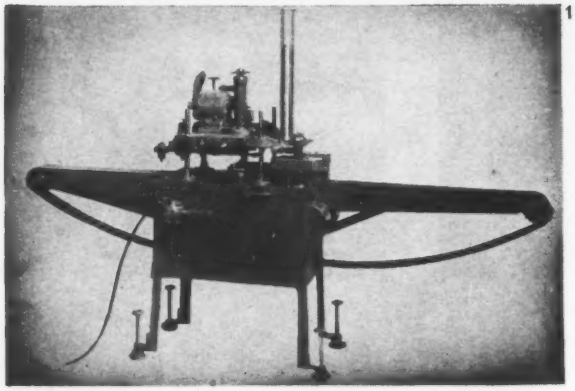
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14. Combined capper and corker applies screw caps, depresses corks. Photo Pneumatic Scale Corp., Ltd. 15. A cork-depressing device which is operated on the conveyor line. Photo Pneumatic Scale Corp., Ltd. 16. Detail of cap-pressing device on a fully automatic filling machine. Photo Stokes & Smith Co. 17. Fully automatic, straight-line, steam-actuated vacuum capping machine uses dry, live steam, vacuum seals 100 jars or bottles per minute. Photo Anchor Hocking Glass Corp.

large-capacity hopper is so designed that a casual glance from the line operator will determine just when a new batch of corks is required.

Feeding of the filled but uncorked bottles into the machine is controlled by an electric feed switch. The machine is so designed as to automatically stop whenever a "break" appears in the line of advancing bottles and to remain stopped until the break is closed. The machine is equipped with a vari-drive, making possible its operation at exactly the speed called for by the production schedule and its synchronization with the other units of a packaging line.

Vacuum sealing

In general, the result of the use of vacuum is that the action of oxygen as a destructive agent is retarded to a point where, for all practical purposes, it is non-existent. These advantages may be summed up as follows:

1. The prevention of rancidity of oils and fats contained in food products. Even though this deterioration may take effect slowly, it is difficult to foresee how long a package may remain on a dealer's shelf and even slight rancidity is enough to affect flavor adversely.
2. The elimination of discoloration due to oxidation. No "off color" product is appetizing or saleable.
3. The preservation of delicate flavors and aromas. This is particularly true where a mechanical vacuum is used.
4. The retarding and practical elimination of the growth of mold and yeast. The rapid multiplication of these micro-organisms is dependent on the presence of air.
5. The effective reduction of the corrosive action of acids and other chemical properties of food products. Corrosion is a process of oxidation and hence is stopped through the use of a vacuum.

In general, there are two types of sealing machines for the application of metal caps under vacuum-mechanical and steam. In the mechanical type, there are two styles. One effects a vacuum seal by means of a vacuum pump and the other creates a vacuum by means of a piston arrangement built in the machine itself.

Mechanical vacuum types of sealing machines are available in a variety of styles, ranging from the simple, hand-fed types to the completely automatic styles. These machines are designed to apply caps, under vacuum, to jars, tumblers and bottles.

The development of vacuum by the displacement of air with steam provides a unique and highly important characteristic in that the vacuum is formed after the closure has been applied, thus preventing the sucking out of a cold packed product from the container or the boiling over of a hot packed product. Mechanically, the steam-vacuum system is simple. No vacuum pumps are used. All that is required successfully to operate the system and the capping machine is a steam supply and electrical current.

While the primary purpose of the steam is to displace the air from the head space, it also serves a secondary function in that it sterilizes the cap and creates a sterile atmosphere for the capping operation. In general, the speed of the machine may be adjusted to the convenience of the packer and the machine can be set into packing conveyor lines. Most varieties are readily adjustable for differing sizes and styles of jars or tumblers and for varying sizes of closure. Regulation of the degree of vacuum—with the steam types—can be governed by the amount and temperature of the steam atmosphere. With the mechanical types, such regulation is effected by adjustments of the pump controls.

Labeling machines & devices

Broadly speaking, there are four different methods which underlie the principles used in the design of modern labeling machines:

1. ***Adhesive is applied to "pickers"*** which in turn carry the label from the bottom of a hopper to the package. The label is clamped to the package by grip fingers; the pickers detach themselves from the label and then pressure is applied either by flexible wipers or by press wipers so that the adhesive which remains on the label from the pickers causes the label to be attached to the wall of the package.

2. ***Adhesive is applied to a rubber pad.*** This pad is brought in contact with the package and then the label in turn is brought in contact with the adhesive-covered surface of the package, after which pressure is applied by wipers to form the union.

3. ***The label is fed by pneumatic means*** from a hopper, passed over an opening where a spraying apparatus applies the adhesive. By the same pneumatic means, the label is then carried to the package and applied. Pressure is exerted to complete the attaching.

4. ***The label is fed from a hopper by means of a pneumatic platen*** which rigidly holds the label over its entire surface in a flat condition and carried tangentially over a twin roller gumming mechanism where a uniform film of adhesive is rolled on to the label. By the same pneumatic means, it is carried and attached to the article, after which pressure is applied to insure firm adhesion. The modern labeler is offered in both semi-automatic and fully automatic models. Methods 1 and 4, mentioned before, are employed for semi-automatic or hand-fed machines; all four methods in the automatic labelers.

Semi-automatic labelers

The semi-automatic or hand-fed labelers on the market today are capable of offering the user capacities from 30 to 60 labels per minute. The production, however, must of necessity depend on the article itself, on the dexterity and application of the operator and the plant management in bringing the articles to and from the machine. Inspection and packing should be done immediately after the operator removes the labeled article from the machine and, in the choice of the labeler, this feature should be strongly considered so as to eliminate unnecessary and costly handling charges. Some labeling machines have an extremely wide range of adjustability, being capable of handling and affixing labels from the size of postage stamps up to labels or panels $6^1/_2$ in. sq.

There are semi-automatics on the market capable of applying more than one label onto the package at one time and applying the foil onto the neck of the bottle, as used in the soft drink industry. These are capable of handling fragile articles, such as delicate perfume vials and serum tubes, which the larger and faster fully automatic machines could not.

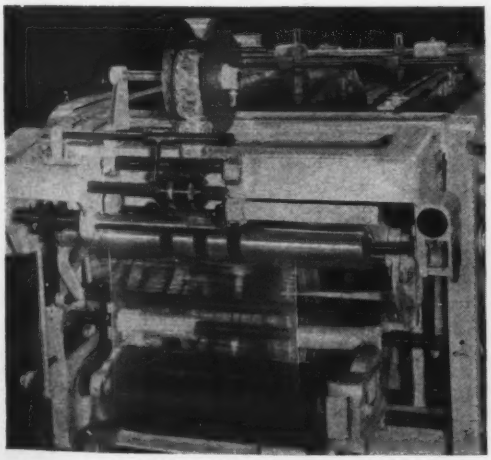
The labeling of paper boxes with paper or paper-backed foil labels or heavily embossed metallic seals, the manufacture of greeting cards, calendars, photomounts, the labeling of cigar boxes, wooden articles, attaching of paper handles to drinking cups, certain types of transparent material to folding box windows, etc., can be accomplished by some of these semi-automatic models.

Automatic labelers

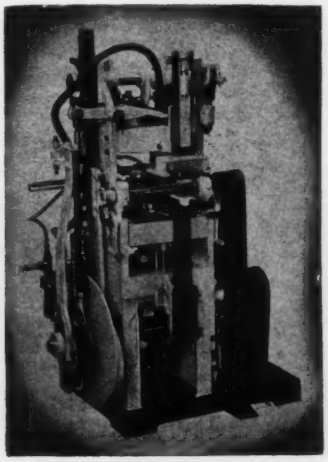
Automatic labelers can be segregated into three divisions:

The rotary type of fully automatic labeler employs method No. 1 and method No. 4 for the application of the label and, as mentioned under the semi-automatic heading, it is also capable of applying two or more labels simultaneously, together with the foil neckband if desired. Consequently, it is particularly adaptable wherever round bottles, irrespective of their size, are used.

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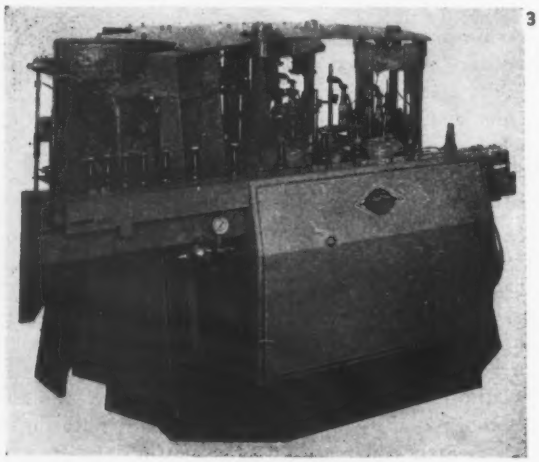


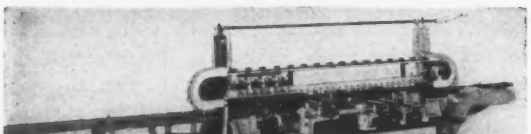
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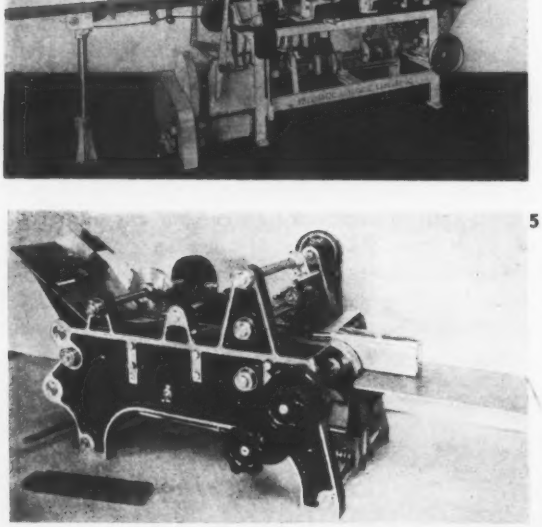


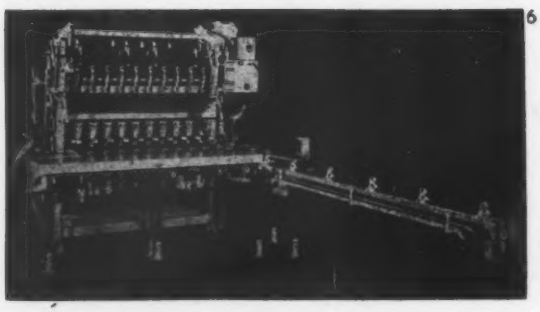
1. Thermoplastic labels, applied from roll, are widely used in baking industry, have many other potential uses. This is typical installation of roll-labeling mechanism on wrapping machine. Label is applied to transparent paper automatically as product is wrapped. Photo Oliver Machinery Co. 2. Hand-fed, semi-automatic labeler with foot control. Photo New Jersey Machine Corp.

3. Automatic rotary labeler used for soft-drink or beer bottles. Photo Liquid Carbonic Corp. 4. Duplex front-and-back labeler for face-cream jars. Photo Pneumatic Scale Corp., Ltd. 5. Machine for printing code numbers and symbols on labels. Photo The Lakso Co. 6. This straight-line, multiple automatic labeler can label 10 bottles at the same time. Photo Edward Ermold Co.


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The bottles are taken from a conveyor by means of a star wheel or similar mechanism and timed through the machine. They are automatically ejected onto a conveyor and led away from the equipment to be inspected, packed or stored. They can attain speeds of 60 to 200 per minute.

The straight-line type, being of more recent design, can be used more universally as its construction allows a wider latitude in the shape of the containers and greater accuracy in the "spotting" of the label. All four methods described above are used in the feeding and attaching of the labels. Further, their design allows the adhering of front and back labels simultaneously and, by duplexing (i.e., labeling two articles at a time), higher speeds are obtained than with the rotary type. Productive capacities of 120 per minute are obtainable.

The straight-line multiple type, as its name implies, labels a group of containers simultaneously. The production or capacity is determined by the size of the group of containers labeled simultaneously, multiplied by the machine speed in cycles per minute.

Available machines of the straight-line multiple type use the "picker" method for transferring and applying body, or body and neck labels to groups of 4, 6, 8 or 10 containers simultaneously for respective capacities of 80, 120, 160 or 200 per minute; or body and foil, or body and neck and foil to groups of 4, 6 or 8 containers simultaneously for capacities of 80, 120 or 160 per minute.

In choosing the type of labeler, certain essential points should be borne in mind:

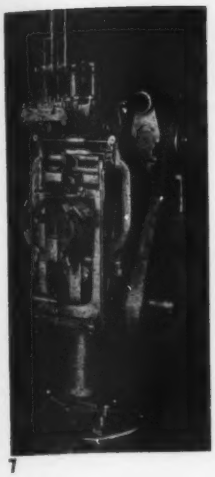
1. The type of label material to be handled—whether plain paper, varnished or lacquered, or foil labels or metallic seals.
2. Whether the label is rectangular or odd shaped.
3. The type of bottle, jar or package to be labeled.
4. Range.
5. Ease of changing from one size to another.
6. Cost of change parts and their simplicity.
7. Control of the adhesive application.
8. The cleanliness of the labeling job.
9. The accuracy of the labeling job.
10. Accessibility of the machine in the plant.
11. Productive capacity that will be required.

Round-can labelers

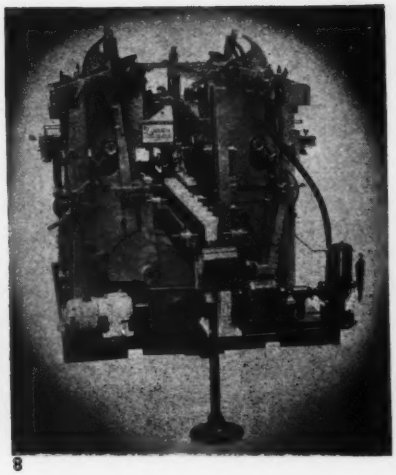
The labeling of round cans presents a different problem since the label as used on this package is of the "wrap around" type, the extremities lapping over each other. For this purpose, round-can labelers have been designed, both of the semi- or hand-fed and fully automatic types.

There is a distinct difference in these two types in that the former covers the label with adhesive over its entire surface, the latter applying adhesive partly to the can body and only to the glue lap of the label.

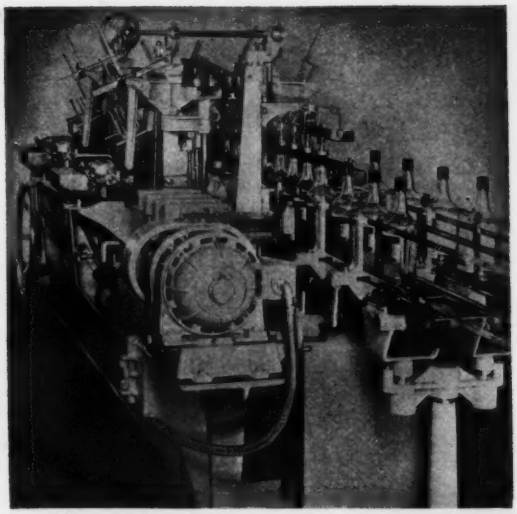
In the semi-automatic machine, the can as well as the label are introduced manually and the finished article ejected by hand as well. From 4,000 to 6,000 cans can be labeled per eight-hour day, the variance depending on the size of the package, the facility of bringing the



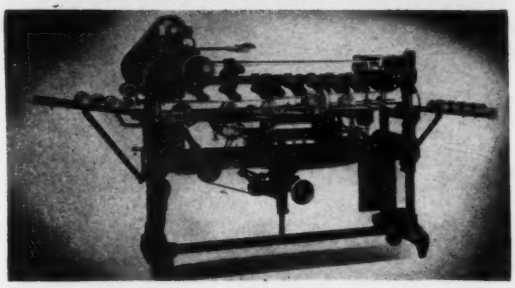
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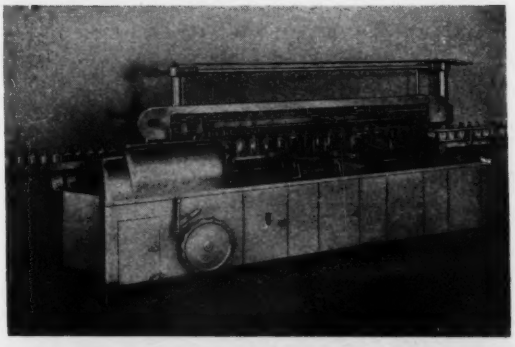
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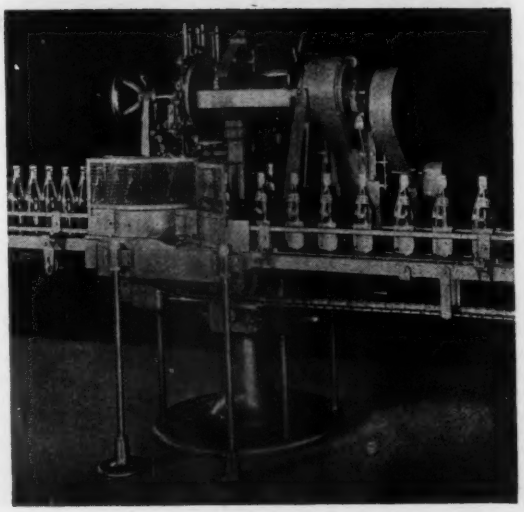
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work to and from the machine and the dexterity of the operator. These machines have fairly large ranges and require no change parts, the range being self-contained.

In the fully automatic round-can labelers, the cans roll down a track and have "spots" of adhesive applied. These "spots," when the can passes over the label hopper, pick up the label which is then wrapped around the can, the label having a glue strip applied to the lap. This glue strip forms the closing joint. In preparing labels for these machines, to get the best results the grain should run parallel to the longest dimension.

Label gummers

Label gummers are not truly labeling machines, for they are not used actually to apply the label to its point of final contact with the package. Their function is, rather, to apply a gummed coating to an uncoated label or to moisten a pregummed label and thus to facilitate hand application. A number of types and variations are available, but all have the general characteristic of a motor drive rotating a cylinder partially immersed in, or in contact with, glue or gum or water.

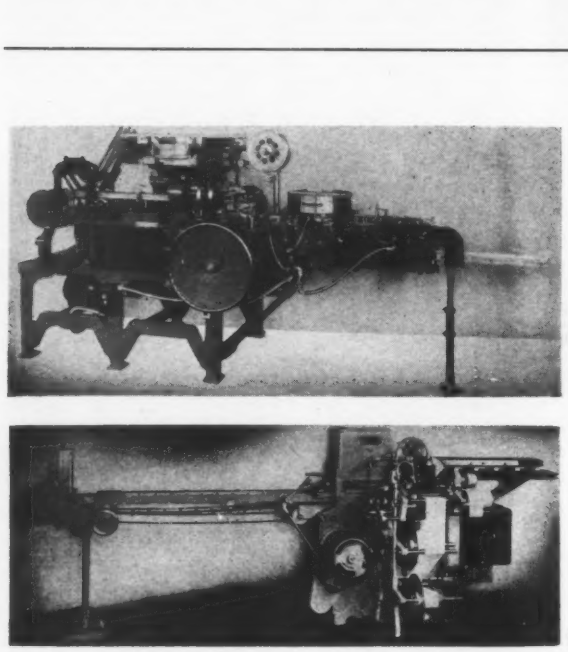
Coding devices

A number of devices have recently been developed for applying code numbers or other serial identifications to labels. These are usually punch-type machines designed for use near or adjacent to the labeler. They operate at speeds of as high as 250 labels per minute and are available in types that print or perforate. Change-over of code symbol is usually readily accomplished with but a short shut-down period.

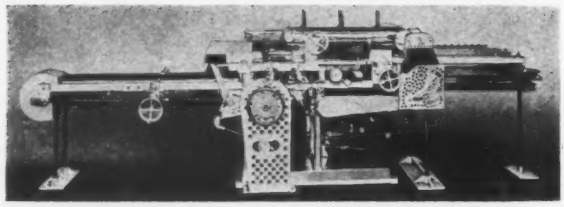
7. Semi-automatic labeler for bottles and jars adjusts to 1-gal. size, applies front, back, all-around, neck or foil labels together or separately. 8. Full-automatic duplex labeler applies front and back labels simultaneously. 9. Versatile labeling machine for bottles of various shapes and sizes which is especially adapted to new, lightweight glass. 10. Heavy-duty round-can labeler. 11. Duplex labeler with full-automatic spotting device rotates bottles, applies labels in fixed location. 12. Rotary labeler for various round bottles. Photos 7, 9, 12, Economic Machinery Co.; 8, New Jersey Machine Carp.; 10, Standard-Knapp Corp.; 11, Pneumatic Scale Corp., Ltd.

Wrapping equipment

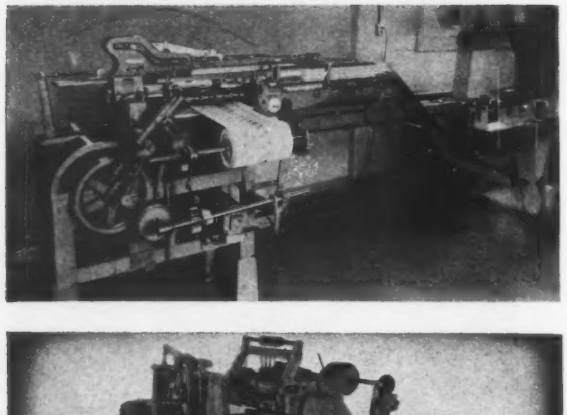
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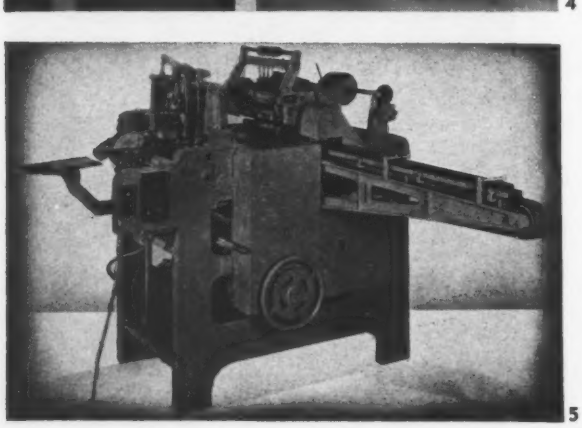
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Package-wrapping techniques can be divided into two broad groups: removable wrapping and tight or wet wrapping, so called because the inside surface of the wrapper is covered with glue. Wet wrapping has taken its place in the wrapping of cartoned goods, such as soap, powder, salt, sugar, cereals and other food packages, because of its ability to prevent insect infestation and leakage. Nevertheless, because of its practicability and adaptability, removable wrapping has come into wide general use for many purposes in present-day packaging.

Prior to the restrictive orders, manufacturers were much inclined to increase their use of attractive overwraps of cellophane. They realized that the sales value of a package is considerably enhanced when it is so packed that it does not lose its attractiveness once the outer wrapper is removed. Particularly is this true for such items as confectionery, cosmetics and the like. Under normal production conditions, moistureproof cellulose would be used where a fairly airtight, moistureproof package was required. Under wartime restrictions (L-20), however, such overwraps are forbidden. Glassine and waxed paper, not being—at least for the present—on the priorities list for such overwrapping, may be used. Crackers, tobacco, cigarettes, chewing gum, etc. are examples of the goods which might require such protection. In the case of cigarettes, the protection of cellophane wraps is possible when foil is not used under L-20.

When private brands for different customers are to be handled, plain cartons may be wrapped in printed materials or in unprinted wrappers and labels, for identification and appearance. The loose wrappers can be held in place on the cartons by means of thin glue lines applied automatically, which will prevent the wrappers slipping from the cartons after they have been opened.

The loose wrap lends itself especially well to the placing of a circular or premium between the box or carton and the outer wrapper and where a revenue or tax stamp is necessary, as in the case of cigarettes. Provisions have been made on many automatic wrapping machines to make the feeding of the circular from a magazine a part of the wrapping operation.

A great advantage of the loose wrap is, of course, that it can come in contact with the article to be wrapped

1. Cartoning and wrapping machine wraps candies in small packages, then cellophane wraps filled cartons at 150 cartons per minute. Photo U. S. Automatic Box Machinery Co., Inc. 2. Automatic machine for wrapping irregularly shaped candy bars. Photo Package Machinery Co. 3. Wrapping machine adjusts for trays, extension-edge boxes, cartons. Photo Package Machinery Co. 4. Heat-sealing machine wraps 1800 yeast cakes per hour. Photo Hayssen Manufacturing Co. 5. Machine wraps 5 bouillon cubes in packets, 60 packets per minute. Photo Richard Machine Co.

without the need of an inner protective covering. Individual pieces of candy are cut and sized on the same machine and then wrapped in transparent cellulose or waxed paper with the ends folded or twisted. Irregular pieces of chocolate candy are wrapped in foil. Many different sizes and shapes of candy bars are wrapped in cellulose, paper or waxed paper and the addition of the electric eye makes possible the use of printed wrappers in roll form. Various kinds of pops are now being wrapped in waxed paper or heat-sealing cellulose on automatic machines. Bread and cakes, too, lend themselves equally well to the loose overwrap, as do cigars, yeast and countless other articles.

It is only recently that the use of automatic wrapping has been considered in the frozen foods industry and here the loose wrap is necessary. Wrappers which can be heat sealed withstand the low temperature conditions necessary in the packaging and preserving of frozen foods are waxed paper or heat-sealing cellulose. Both of these materials are, of course, obtainable in printed roll form and the electric eye can be used to register the printed panels properly.

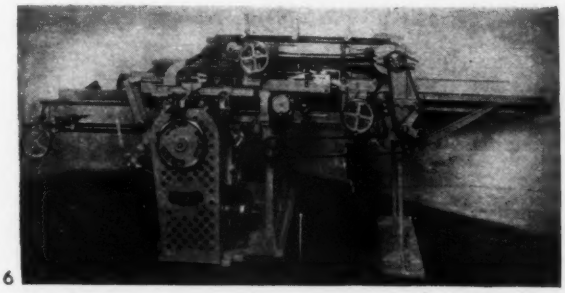
Other uses have also been found for carton and box wrapping machines. Automatic bundling of cartoned merchandise is a comparatively new development and is very popular with the manufacturer who is confronted with the problem of distributing his goods economically. The cost of paper wrappers is considerably less than that of pasteboard containers and the lower weight of paper as compared with the pasteboard will materially reduce shipping costs, especially where the shipping distance is fairly substantial and particularly when paper shortages may cause high prices of board.

One new development, of particular interest because it meets certain package specifications for military and Lend-Lease purposes, is a double-wrapping machine which produces a securely sealed "package within a package" at the rate of 60 to 70 per minute. The double package is made up of a cut and scored carton blank and an inner liner of wax, parchment, glassine or a laminated film. Inner liner is fed from a roll, and is cut, formed, folded and sealed around rigid forming blocks, following which the carton blanks are folded around the blocks, then side- and bottom-sealed.

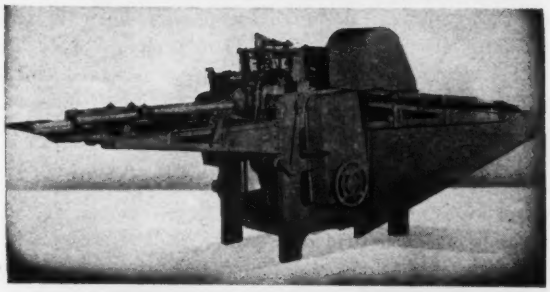
The advancement of machine wrapping has also resulted in the development of many new machines of a highly specialized nature. Included in this group are machines for wrapping cakes of soap, bars and pieces of candy, cigars, packages of cigarettes, yeast cakes, fruit drops and mints and many similar articles and packages. All of the popular types of wrapping materials can be handled by these machines, and here again, electric-eye registration has been important. The wrapping operation on these machines has also been improved to decrease the amount of wrapping material needed. Especially is this true in the confectionery trade, in the wrapping of candy pops, where the use of a tight twist, heat sealed, has decreased by about 20 per cent the amount of wrapping material needed.

While box or rectangular-object wrapping is an im-

6. A carton wrapper which may be adjusted for speedy cellophane wrapping of shorts and shirts. Photo Package Machinery Co. 7. Machine wraps various width bandages in different size rolls. Photo Richard Machine Co. 8. Semi-automatic machine cellophane wraps flat packages in crimped style. Photo Miller Wrapping and Sealing Machine Co. 9. Wrapping equipment for candy, other irregularly shaped items. Photo Lynch Manufacturing Corp.



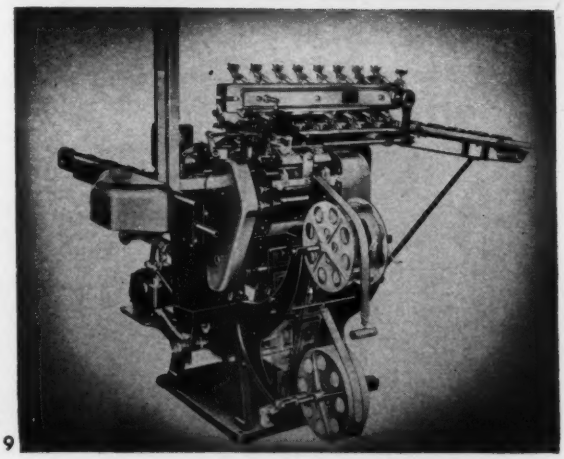
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portant part of the wrapping machine art, it is only one part. For candy, machines are available to take the candy in plastic form, form it, cut it and wrap it, either with folds or with twisted ends and speeds can be attained up to 500 or 600 a minute. With twisted wrapping, the machine can be arranged so that the twisted ears can be colored and colored inserts can be put inside the wrapper. Old standbys, such as kisses or caramels, can be dressed up now in a highly attractive and salable form and, as a result, the merchandising of candy is taking a new lease on life. Waxed paper wrapping of these products is still possible.

Wrapping baked goods

Wrapping in the bakery field has assumed the proportions of a highly specialized science. As in many other fields, there are to be found several forms of producer-distributor organizations, among which are the local retail baker, the wholesale baker with a regional distribution, and the national organization with its own far-flung distribution set-up. The products, too, are varied. In some cases a fresh output is baked daily, in some the shelf-and-store life is several days, and some products must be wrapped for a store life of weeks. Hence it will be seen that the conditions imposed are unique. For the most part, the goods represent a short merchandising life, and sell in the lower cost brackets in a highly competitive field.

The development of automatic packaging machinery, capable of high-speed mass production at minimum cost, has without a doubt been a contributing factor, first, in the growth of large bakery organizations with a wide distribution and, second, in supplying better, fresher and more sanitary products to the consumer at lower cost. The intangible values of packaging are nowhere more obviously of prime importance to the consumer than in the case of baker products. The housewife knows, of course, that packaging represents a cost, but is willing to pay that cost—within reason—because of its benefits.

As a matter of fact, for the bakery industry as a whole, packaging materials alone represent the heaviest expenditure in the total ingredient list outside of flour and sugar. This was established by the 1935 Census of Manufacturers. Packaging requirements of the industry, particularly for cake, vary widely. The retail baker needs little more than a sheet of paper or an inexpensive box. The baker who distributes from house to house needs more. The large wholesale baker usually has a fully developed line of packages, printed or lithographed for identity and sales appeal, and is very much concerned with savings of packaging material which in individual units may be minute but in the aggregate represent a considerable volume. Such savings are possible when using modern wrapping machinery.

There are several manufacturers who specialize in wrapping machinery for the baking industry, making "high-speed, single-purpose" models on the one hand or semi-automatic specialty wrappers on the other. "High speed" in the field of cake baking is perhaps fifty units per minute. Some of these machines make use of an automatic card feeder, this being a necessity and practically a basic part of the machine. The cards are usually of stiff, odorless, unwaxed board 0.020 in. or 0.025 in. thick and rectangular in shape. They are fed into the machine automatically, thus leaving the operator's two hands free to place the cake on the intermittent chain as it passes her station.

A recent innovation is the automatic feeding, placement and gluing of labels of any acceptable size or shape. These labels are fed from a magazine by the use of a vacuum, pass through a gluing mechanism and are pressed to the wrapping material just before it passes between the paper-feed rollers. This places the label in proper position on the package. Another device is one which applies a continuous printed band to the wrapper, the band being placed either on the inside or outside, running lengthwise of the package. Bands may be of wax paper or heat-sealing cellulose.

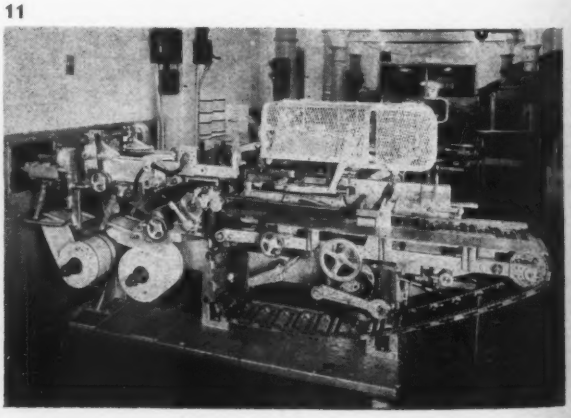
The usual type of fold on these machines is the so-called single point "underfold" wherein the ends are brought neatly beneath and sealed against the supporting card. This type of machine is used principally for heavy production of "nickel cakes." Many varieties can be handled but the over-all size of the card must be within the original limit of the machine.

10. For wrapping cookies, a heat-sealing machine automatically measures and cuts sheet required. Photo Hayssen Manufacturing Co. 11. Yeast-wrapping machine in foreground slices 1-lb. yeast cakes, wraps 60 sliced groups per minute. Photo Battle Creek Bread Wrapping Machine Co.

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Other types of machines are available which are adjustable for the wrapping of a variety of bakery products at high speed, capable of wrapping products ranging in size from three to six inches in width and varying in height from one to five inches. The speed will range from 35 to 50 cakes per minute. Semi-automatic types are of great use in the moderate-sized bakery where a wide variety of types and sizes are handled. In many of these machines a variety of units can be wrapped without changing the size or shape of the container. In cases where a major size change is needed, this can be accomplished through the interchange of simple parts.

Wrapping irregular objects

During recent years there has been great progress in the wrapping of objects irregular in shape. Transparent film has been the favorite material, and it has been widely employed by cake-bakeries, although textiles, garments, confections and other objects which can be carried on a cardboard support have been so wrapped.

Obviously, any irregular object can be wrapped in an automatic machine if it is placed in a carton or in a four-sided tray. The other extreme is to wrap the object without a carton and without any cardboard support at all, but in most cases this method is entirely impractical at the present stage of machine development. As an alternative, it is possible to use either a scored flat card automatically formed in a wrapping machine to form a "U-board," or to use a simple flat card without scoring or forming.

Sometimes, as in the case of such very delicate merchandise as iced cakes, pies, etc., the "U-boards" also give physical protection against crushing, and they also produce a surface against which to make the end folds.

"Underfolding" on automatic wrapping machines was developed primarily to assist in the wrapping of objects of irregular shape, or items which are so thin that an end fold cannot be produced practically. Machines are now on the market which will produce either end folds or underfolds with a very simple adjustment and without the addition or removal of extra parts. Almost any piece of merchandise coming within the maximum and minimum limits of the wrapping machine can be handled at a relatively high speed if it will rest in position on a simple cardboard support.

One method of wrapping individual pieces, articles or packages is with a heat-sealing machine which takes the heat-sealing film from a roll, automatically forms a tube, and makes a longitudinal heat seal, hermetically sealing the article in the film. Two packages are made during each cycle of this machine which has duplex heads and can produce 60 complete packages per minute. When printed film is used, the printing can be registered by means of a photo-electric registry attachment, or continuous printing can be employed for this purpose.

An interesting development along the lines of registration is the use of a miniature printing press, using quick-drying aniline ink and geared to the paper feed of the machine. The press prints material as it is being fed from the roll into the machine. Registration is automatically taken care of, without the use of an electric eye.

Wrapping chewing gum

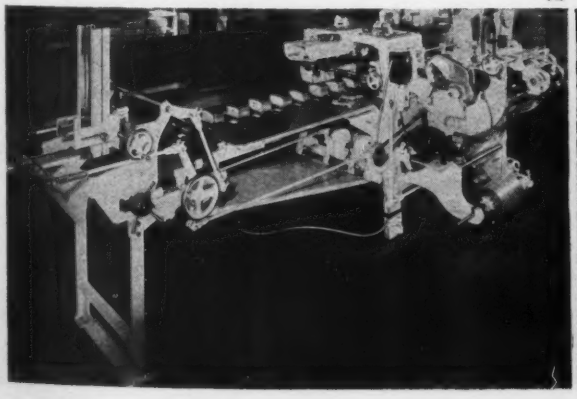
The use of strong wrapping materials has resulted in the development of easy-opening devices such as tabs, tapes and machine-made nicks to facilitate the opening of the packages. Such devices are now being used extensively on such small, packaged goods as cigarettes, fruit drops and chewing gum.

The wrapping of chewing gum is receiving a great deal of attention at present because of the development of high-speed automatic wrapping machines. A machine is now available to wrap small individual sticks of gum at a speed in excess of 600 a minute. The machine will apply an inner wrapper fed from a roll and a printed band fed in sheet form. A thin strip of adhesive will glue the outer wrapper to the inner and prevent its slipping off the end of the stick. Regular sizes of individual sticks are being wrapped with an inner roll-fed wrapper and an outer printed label, at speeds up to 400 a minute.

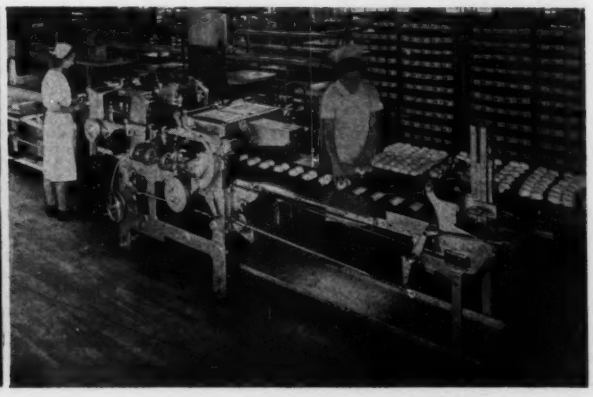
The regular five-cent size package is being produced on single high-speed machines which can wrap the single stick at 1,000 per minute. The single stick has an inner wrapper of dry wax or foil and a label fed from a roll. Five of these single sticks are then assembled,

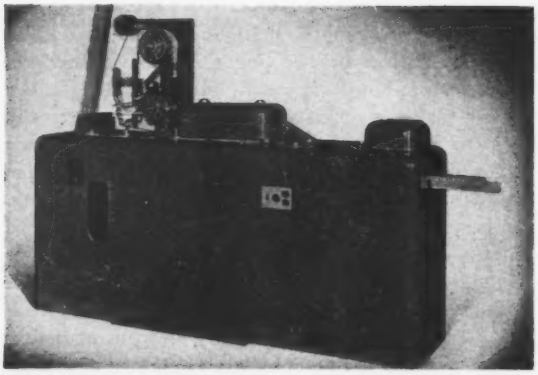
12. A quickly adjustable cake wrapper which is complete with a card feeder and dater, a label applicator and dater, a variable speed drive and underneath fold. 13. A cake-wrapping machine which cellophane wraps cakes in cartons. Photos Battle Creek Bread Wrapping Machine Co.

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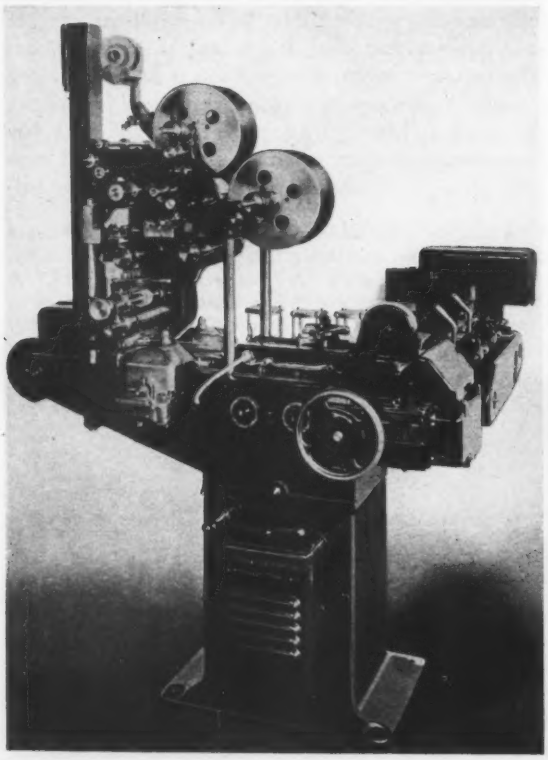




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and an outer, over-all, roll-fed wrapper, tightly sealed and including the zipper tape, is applied.

In considering machine wrapping, three elements always enter the picture—speed, adjustability and price—and the three have an intimate relation to one another. The more specialized the machine, the higher is possible production, and the more difficult it is to change the size. At one extreme are the high-speed chewing-gum machines just mentioned; at the other extreme are the carton-wrapping machines, based on the principle of bread wrappers, where a size change can be made in less than five minutes over a wide range, but where speed is limited to slower operations.

Semi-automatic machines

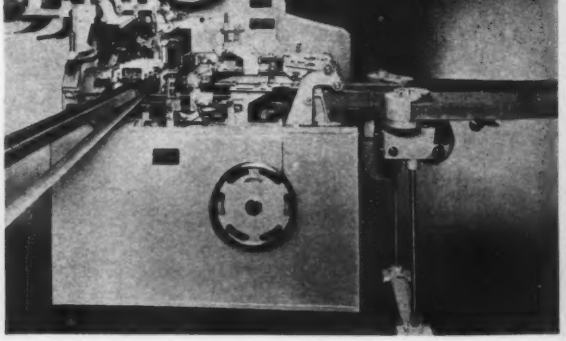
Semi-automatic wrapping machines require a smaller investment and permit extreme flexibility with regard to size and nature of packages. This makes them valuable to both the small and large-scale manufacturer. It gives the former all the wrapping equipment he needs and allows the latter an economical means of wrapping his smaller runs or producing novel packages.

Versatility of the semi-automatic wrapping machine extends beyond mere "adjustment range." It permits the wrapping of irregular, loose or stacked items or packages, because of close contact of the operator with the folding operation. The odd package can be guided, by hand, just enough to make allowance for its peculiarities. Examples in this category include packages composed of several loose pieces, as when four bars of soap and a wash cloth are wrapped together.

The semi-automatic machine will wrap with a variety of materials, either heat- or glue-sealed, including heat-sealing cellophane, waxed papers, waxed foil and the non-heat-sealing materials, such as plain transparent

14. Cellophane wrapper which can apply tear strips. Photo F. B. Redington Co. 15. Machine for wrapping irregular objects in sheeting fed from roll, heated under electric plates. Seal is formed by twisting finished package. Photo Stokes & Smith Co. 16. Wrapper for high-speed application of outer wrap and "zipper" tape to cigarette packages. Photo Package Machinery Co. 17. Soap wrapper adjustable for sizes. Photo Package Machinery Co.

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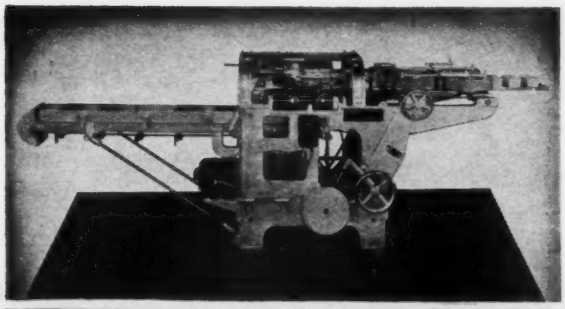
sheets, kraft and other ungummed or unwaxed papers. If a manufacturer of pharmaceuticals should desire to wrap his packages first individually in heat- or glue-sealing cellophane, then bundle them by dozens in kraft paper, the semi-automatic would perform both jobs, laying glue on the kraft paper to seal it.

Instant adjustability makes the semi-automatic wrapping machine suitable for very short runs. On a moment's notice, it can be changed over from the smallest to the largest package within its range. Adjustments have been so simplified that a girl operator, unassisted, can make a complete size change without tools.

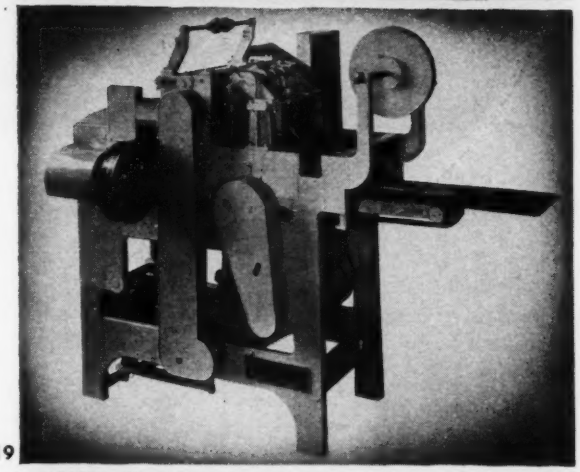
Speed of semi-automatic machines, while naturally less than those of the full automatic, is adequately high to exceed, by many times, that of hand wrapping and wrapping by means of simple fixtures and jigs. In some cases, particularly where frequent adjustment is required, or where great economies in wrapping materials are possible, the semi-automatic shows even greater savings than the automatic. Each machine has its place and they seldom overlap.

Packages produced on semi-automatic machines are uniformly neat and well sealed, whether with heat or glue. When heat-sealed, the hot plates are kept under thermostatic control, so that there is no injury to either the wrapper or packages. Packages containing heat-perishable goods, such as chocolate, butter, icings, frozen foods and the like, can, if necessary, be passed quickly through the heat-seal region, so that a seal takes place, but the heat cannot penetrate far enough to be injurious. When glue is used for sealing purposes, the amount of flow and area of application can also be positively controlled, so that results are unerringly the same and the machine user can have confidence in the uniformity of his product, both in appearance and pro-

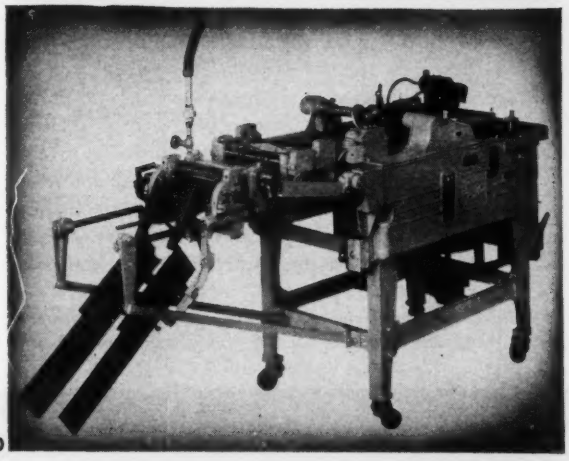
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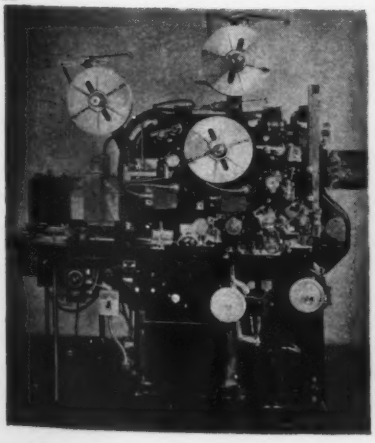


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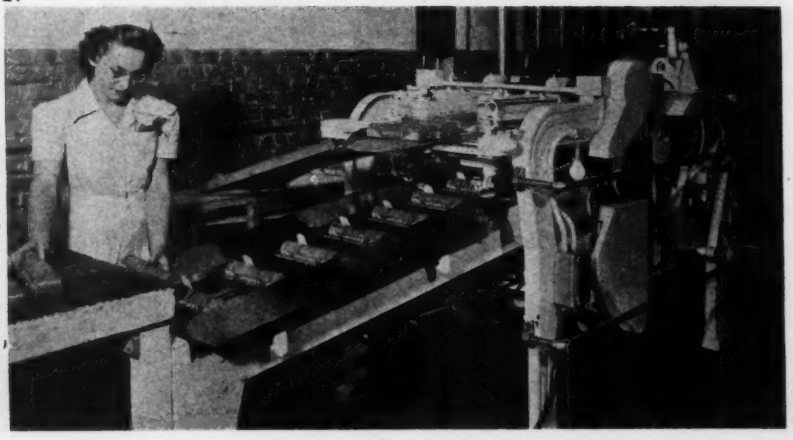


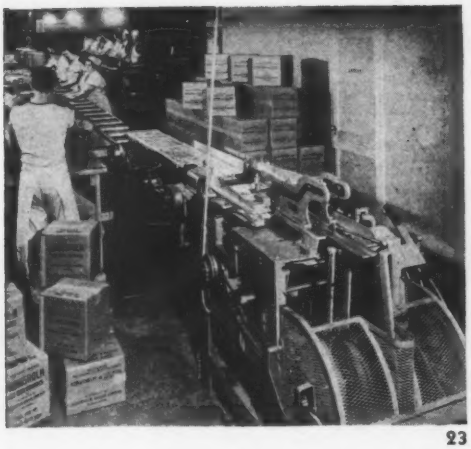
18. Installation group wraps 6 and 8 cigarette packages. Photo Battle Creek Bread Wrapping Machine Co. 19. Bouillon-cube wrapper. Rate: 100 per minute. Photo Richard Machine Co. 20. Small-pouch-bag maker. Photo Simplex Wrapping Machine Co. 21. Wrapper for cookies in boats automatically heat seals labels. Photo Oliver Machinery Co. 22. Machine which wraps individual sticks of gum, bands 5 with printed wrap, applies outer cellophane, all at speed of 600 sticks a minute. Photo Package Machinery Co.

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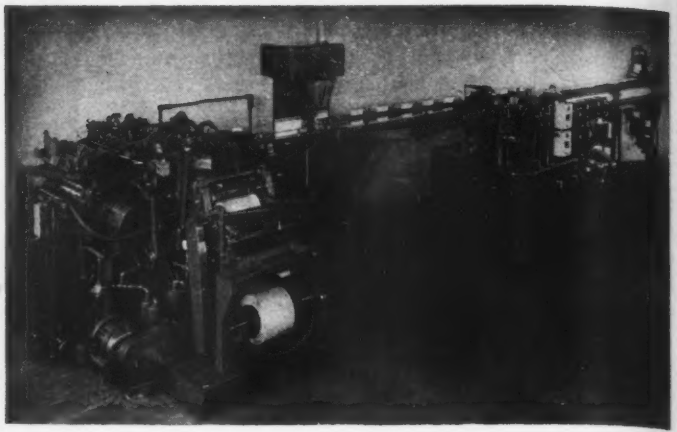


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23. Heat sealer wraps cartons of baked goods at 1800 packages per hour. Photo Hayssen Manufacturing Co. 24. A double wrapping machine produces securely sealed "package within a package" at 60-70 per minute. Photo Pneumatic Scale Corp.

tection afforded by the wrapper when applied by this efficient method.

Bottle wrapping is another achievement of the semi-automatic wrapping machine. Using many of the principles of the package wrapping machine to retain the valuable feature of adjustment for many sizes, this equipment also provides a clever means of neatly tapering the cellulose wrap from the shoulder to the cap of the bottles.

Ordinarily, the semi-automatic machine folds and seals the wrapper over the bottom and two ends of the package in the manner that an ordinary biscuit carton is usually wrapped. However, where a very shallow package is to be wrapped, where the ends do not offer sufficient depth for a satisfactory end seal, the end folds can be tucked under the ends of the package or "underlapped." This feature is useful on flat packages, such as cake slices, sheets of writing paper and even extension-edge candy boxes, which are recessed at the sides and at the ends so that a conventional seal is apt to be entirely impractical.

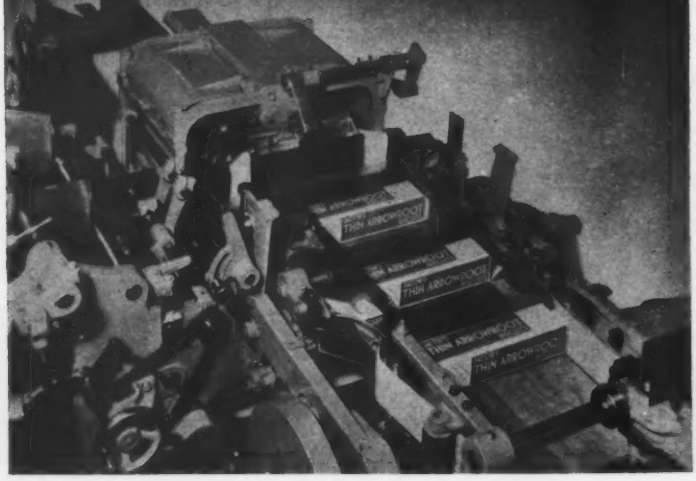
The semi-automatic wrapping machine can also be furnished with a number of money-saving attachments, such as a coding device for perforating letters or numbers in the wrapper, or a banding attachment for attaching printed bands to the wrapper.

Hand-wrapping fixtures

A number of simple and inexpensive tools have been developed, in recent years, to aid hand operators in wrapping heat-sealing materials. These include hot plates of various types upon which a package may be placed momentarily to achieve a seal. Where line seals or spot seals are desired, special heating irons, equipped with thermostatic controls and similar in appearance to soldering irons, are sometimes utilized.

25. Close-up of the folding, slitting and gluing-mechanism of a sheet-fed wrapper with slit-end folds. Photo Battle Creek Bread Wrapping Machine Co. 26. Installation for cellophane wrapping tomato cartons. Photo Hayssen Manufacturing Co.

25



26



Tight-wrapping equipment

Tight-wrapped packages now are standard with many manufacturers and packers of food and of grocery products. First adopted a number of years ago by some of the cereal manufacturers, where its greatest advantage was in keeping the weevil from getting into the contents, the tight-wrapped package has been adopted for use with many other products, such as flour, soap powders, salt, coffee, cereals, etc.

With the tight-wrapped package, the plain unprinted cartons are filled and sealed in the regular way. There are a number of different makes of semi-automatic and full-automatic carton-filling and sealing machines on the market. After the carton is filled and sealed, it is fed into the tight-wrapping machine which automatically feeds the paper label as the carton enters the wrapping machine, glues the label all over on the blank side with a thin coating of adhesive and wraps it tightly around the filled carton, making a perfectly tight-sealed, non-sifting, weevil-proof package—and one which is also attractive.

Various types of cartons with inside bags or liners can be used with the tight-wrapped package, as well as different types of opening devices. In the salt industry, the tight-wrapped package is now being used by many of the leaders, and one of the most satisfactory salt packages is a carton made of asphalt-lined board which is tight-wrapped on the outside. For coffee, wax or parchment paper liners are generally used on the inside of the carton and the cartons are tight-wrapped on the outside. For flour, the regular chipboard carton is used and some of the packers have these made with a blue lining on the inside which gives a whiter appearance to the flour. Various combinations of cartons, liners and labels can be used to insure the product getting to the consumer in the best possible condition.

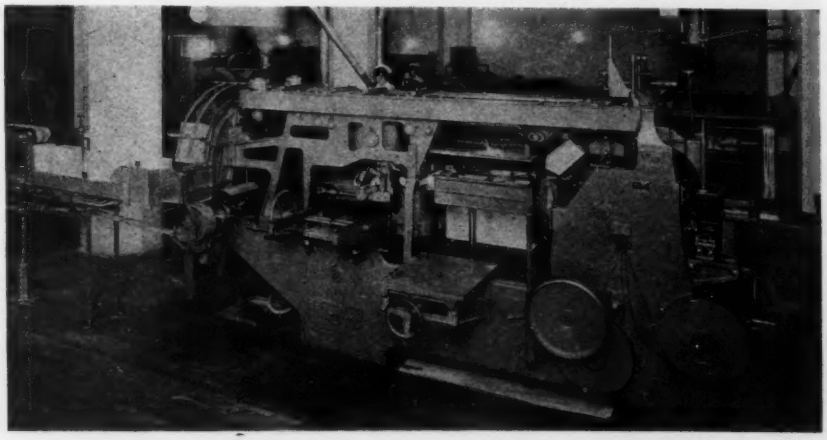
Another advantage of the tight-wrapped package is for the packer or manufacturer who packs private-label brands for different customers. If he uses the tight-wrapped package, he can use the same carton and merely have different labels for the different brands. This means a saving as it is not necessary to carry a number of different printed cartons on hand. With the tight-wrapped package, various types of labels giving different styles of end folds can be used to suit the conditions. Some labels are die-cut so that each end flap of the label

1



1. Tight-wrapped packages are unprinted cartons on which all-over printed labels are glued and tightly sealed.

2



2. First used to keep the weevil from cereals, tight-wrapped packages are now, for other reasons, standard for many food products. This typical tight-wrapping installation is fully automatic, handles range of sizes and types of end folds, has a speed of 60 to 70 per minute. Photo Stokes & Smith Co.



3. Versatile automatic tight-wrapping unit for applying printed wrappers to medium and large carton shells. The wrappers are fully glued to all carton surfaces and can be handled either in sheet or in roll form. An operator is needed only to replenish the supply of wrappers and glue. Speed of this machine ranges from 40 to 70 cartons per minute. Photo Pneumatic Scale Corp., Ltd.

is glued down separately. Others are rectangular, making a gusset fold on the end.

Varnished tight wraps

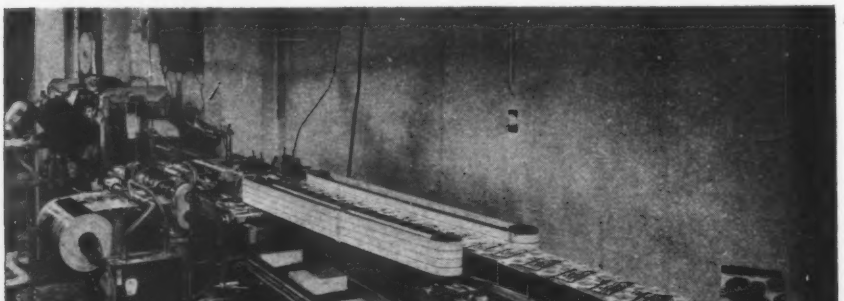
Recently the varnished label has been adopted by a number of packers and manufacturers using the tight-wrapped package and the package tight-wrapped with the varnished label makes an ideal container for many food and grocery products. The varnished surface makes the package attractive; the colors show up to advantage and the varnished surface will not accumulate dirt or dust as quickly. Also, the package is more moistureproof since the varnish gives an extra coating on the outside. Another variation of the tight-wrapped package is the one wrapped with a metal-foil wrap. In this case, the labels are made of metal foil laminated to paper so that the outside of the label is the printed metal foil and the inside is paper. The inside can then be glued uniformly to the carton.

Another recent development combines the advantages of tight-wrapping and wax-wrapping at considerably lower cost. This is accomplished by printing and waxing only one side of the sheet of paper and gluing the underside to all four sides and top and bottom of the plain carton. This development has been made possible through the perfection of electric-eye methods of registration which permit roll-feeding of the printed and waxed stock. Roll-feed and electric-eye registration can also be applied to regular unwaxed tight wrappers and this is an advantage because roll-printing is less expensive than printing in sheets.

Adhesives*

Various kinds of adhesives can be used to suit the requirements. For the ordinary paper tight-wrapped packages, a cold vegetable dextrine adhesive soluble in water is used. For varnished and foil wraps, there are several kinds of moistureproof adhesives on the market. Substitute adhesives which are made of latex are also now available.

* See also "Adhesives," p. 365.



4. The electric eye with which this machine is equipped controls paper-feeding mechanism which not only measures and cuts off the sheet, but automatically registers the printed design around the package. It is designed to wrap with heat-sealing cellophane as well as with waxed paper, and employs electrically heated plates for sealing the wrapper. Photo Hayssen Manufacturing Co.

Heat-sealing equipment

There are two types of heat-sealing machines: the reciprocal or jaw-type sealer and the rotary sealer. The simplest form is the jaw-type which consists of two heated metal plates which are brought together either by manual or motor-operated mechanism. The rotary sealer consists of two heated rollers through which the bag top passes, these rollers being motor driven.

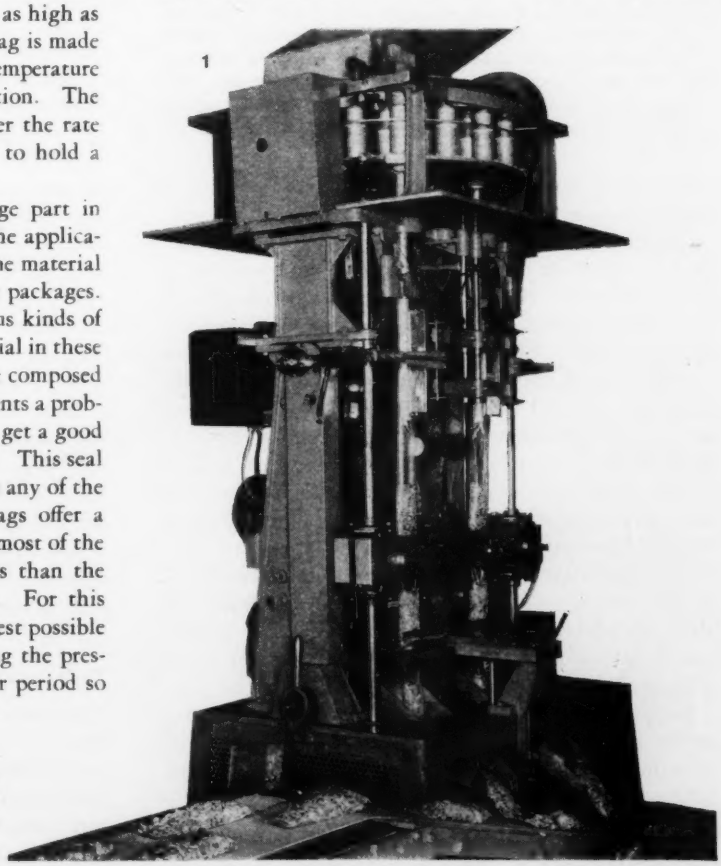
The question of whether to use a jaw-type or rotary sealer is dependent largely upon the type of material to be heat sealed. A study of the factors necessary to make a good heat seal will help in the selection of the proper type of machine. These factors are:

1. The temperature used to furnish the heat
2. The pressure with which the layers are held in contact
3. Time during which hot contact is maintained*

Taking these factors in order, the first to be considered is heat. Just how much heat is required to heat seal a given material and how closely the heat must be controlled are information which should be secured from the bag supplier, who, in turn, gets his data from the fabricator who applies the heat-sealing agent to the film or sheet. Some materials heat seal at 140 deg. F., others as high as 500 deg. F. The job of heat sealing a given bag is made easy or difficult, depending on how much temperature variation can be permitted for the seal in question. The higher the sealing temperature and the greater the rate of heat consumption, the more difficult it is to hold a given temperature.

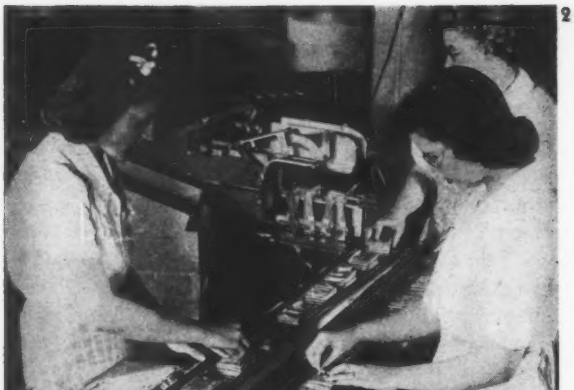
Laminated and multiwall bags play a large part in packaging today, and they suffer most from the application of improper sealing temperatures. No one material offers all the protection necessary for wartime packages. Hence it has been necessary to combine various kinds of materials to make multiwall bags. The material in these bags may be laminated or not; some bags are composed of as many as 12 layers of material. This presents a problem to the heat sealer, because it is difficult to get a good heat seal on the innermost surfaces of the bag. This seal must be accomplished without doing injury to any of the other layers of bag material. Laminated bags offer a particularly difficult sealing problem, because most of the laminating agents have lower melting points than the sealing temperature of the heat-sealing film. For this reason it is desirable to seal the bag at the lowest possible temperature. This may be done by increasing the pressure factor somewhat and adjusting the timer period so that the heat can pass through the several layers and bring about a heat seal on the innermost surfaces. An example of this is found in a bag which when made singly will heat seal at 200 deg. F. with the pressure applied for half a second. The same material made into a bag of three or four thicknesses should be heat sealed at the same temperature. However, this is not possible where production is a factor. It might be found that the time period required to seal the laminated bag at 200 deg. F. would be 10–20 seconds. Obviously this rate of speed would make the heat-sealing operation a bottleneck in production. It is therefore necessary to compromise and raise the temperature and decrease the time factor. The quality of this seal will depend upon the judgment of the person making the adjustment in the time-temperature-pressure relationship.

The user of a heat-sealing machine is naturally desirous of learning how to recognize a seal made at the proper temperature by its appearance. On opaque lacquer-coated materials, the sealed area must be pulled apart to be examined. If the seal is blistered or brittle or if the lacquer has been squeezed out of the seal to a smoky appearing area adjacent to the heat seal, the temperature



1. Rotary heat-sealing machine which forms, fills and heat seals 50 packets per minute with roll-fed film. Photo Stokes & Smith Co.

* See also "Heat-sealing Principles," p. 431.



2. Ration K biscuits are wrapped here. The machine in foreground glues, cuts and delivers cellophane sheets. After operators put biscuits in place, machine overlaps the pre-glued wrapping to form longitudinal seam. Machine in the background folds and seals the ends of the packets. Photo Miller Wrapping & Sealing Machine Co.

was too high. On transparent materials, the above conditions can be observed without destroying the seal.

The presence or absence of a transparent heat-sealing lacquer on a given material is difficult to determine except in a laboratory. One supplier has recently tinted his heat-sealing agents so that their presence or absence can be determined. When a heat seal made on such material is pulled apart, the presence or absence of color in the heat-seal area enables the user to determine whether or not a bond has been made between the two surfaces. It is to be hoped that this or other methods of lacquer identification may be further developed because it is of considerable benefit to the user of heat-sealing materials. It should be pointed out here that in making a heat seal, the temperature of the heat-sealing agent should be raised to the point where the agent is plastic and not liquid. If the agent is brought to the liquid stage it may be squeezed out by the pressure factor or driven into the film on which it is based.

Lacquer-coated materials have a useful life depending on their ability to hold the moisture which is part of their makeup. If they lose this moisture they become brittle and fragile. A heat seal made at too high a temperature drives the moisture from the material in the heat-seal area and accordingly shortens the life of the bag.

The pressure factor is fairly easily controlled. The seal should be made with the least possible pressure, particularly where laminated materials are used.

The time factor limits the production pace of the bag-sealing operation. When additional production is desired there is a tendency to cut down the sealing time. It is important to note that the heat and pressure should be applied for as long a period of time as is compatible with production requirements. A test can be applied to see if the temperature is too high by momentarily increasing the time factor. If a damaged seal results, this is evidence of excessive heat. Means of adjusting the time factor are discussed below.

Heat-sealing agents

The two common types of heat-sealing agents are (a) the lacquer type and (b) the hot melt type. On the first of these, time, heat and pressure factors are very important, because of the minute quantities of heat-sealing agent on the bag material. This quantity is so small that the slightest wrinkle in the bag seal will cause a "pipe" or leak through the seal. Some users maintain that jaw-type machines are better adapted for lacquer-coated films, while rotary-type sealers with pre-heating elements and cooling pressure belts do an excellent sealing job on hot-melt coatings.

The heat seal on hot-melt coated bags and laminated bags should be kept at least $^1/_8$ in. from the bag top, to prevent bleeding of the heat-sealing or laminating agents. The user of heat-sealed bags will find that his bag supplier is familiar with various types of heat-sealing machines and is generally in a position to recommend the type of sealer which should be used on the bag he supplies.

Types of machines

Rotary and jaw-type bag sealers usually have sealing members which are made of brass and heated by electricity. Steel members are sometimes used because of better wearing qualities. The thermal conductivity of steel is slow, hence steel members are recommended only for automatic machines which handle bags at fixed speeds. This regular feeding rate permits the adjustment of the heat in-put to the heat out-put.

Most bag-sealing machines are semi-automatic, that is, they operate at the will of the operator. If possible, they should be fed the same number of bags each minute, for variations in feeding speed make for variations in temperature. If the bagging operations are intermittent, it is desirable to accumulate a batch of bags so that the sealing operations can be regular. This regularity in sealing operations permits fairly easy matching of the heat in-put to the heat out-put.

Temperature controls

Thermostats are generally used to control the temperature on the sealing and pre-heat members. For reasons given above, sealing machines are furnished with excess heat capacity. This excess heat capacity causes temperature variations in spite of the thermostat. The thermostat cuts off the heat when the temperature reaches a cer-

tain point, but all of the heat which is in transit from the heating element to the sealing surface continues to that surface with the result that there is an over-run in temperature. This over-run depends on the mass of the sealing member and the rate at which it is being heated with relation to the rate at which the heat is used. For example, a bag-sealing machine may be furnished with enough heating capacity to heat the sealing members to 500 deg. F., the particular material to be heat sealed requires only 250 deg. F. and the thermostat be set at that point. When 250 deg. F. is reached, the thermostat cuts out, but the heat in transit continues to rise so that an over-run of possibly 20–40 deg. may occur. A lag below 250 deg. F. will probably also occur for the same reason. Both the over-run and the lag result in improper seals.

The remedy for the above condition is to use a rheostat as well as a thermostat. These should be adjusted so that the thermostat turns on and off frequently. This is possible because the rheostat can be set to absorb the excess heat capacity. By this means it is possible to regulate the heat in-put so that it is only slightly more than the heat which is taken away by the bags when they are sealed.

A small signal light should be hooked in with the thermostat so that it will indicate when the current is on or off, which will act as an additional safeguard. A person adjusting the heat control can determine by test approximately how many seconds the light should be on and off and advise the machine operator to this effect. If the operator notices that the light is on or off for too long a period of time, the person who makes the adjustments can be notified. A sudden change in temperature may be due to a foreign substance on the sealing members, a variation in the electric current supply due to additional loads being thrown on, a window or door nearby being opened or closed, the room temperature being raised or lowered, the turning on or off of fans or blowers and many other causes. Despite the excellence of the heat controls in any machine, it is recommended that a check be made on the quality of the heat seals at least every 15 minutes.

Pressure controls

All sealing jaws or rollers must be kept clean, so that they permit the free passage of heat and allow intimate contacts with the bag being sealed.

Provisions for making pressure adjustments are provided in each sealing machine. As the machine parts wear, the pressure will grow less and this should be observed closely and checked at least once a week. The pressure on rotary sealers can be increased by inserting stronger springs and in jaw-type sealers, the pressure may be increased by shimming one of the sealing jaws. When the time factor has been adjusted to its minimum, it is sometimes possible to increase production by having the operator seal two bags at once. Production can be increased by having the machine operator release the bag as soon as it is gripped by the sealing jaws. The operator can then use the dwell, or time that the heat or pressure is applied, to prepare the next bag for the sealing jaw. The machine should be positioned so that gravity will remove the sealed package from the machine without additional handling.

It should be noted that manually operated jaw-type sealers are not recommended for any critical packages. On such machines, the time and pressure factors are dependent upon the human element.

Heat-seal crimps

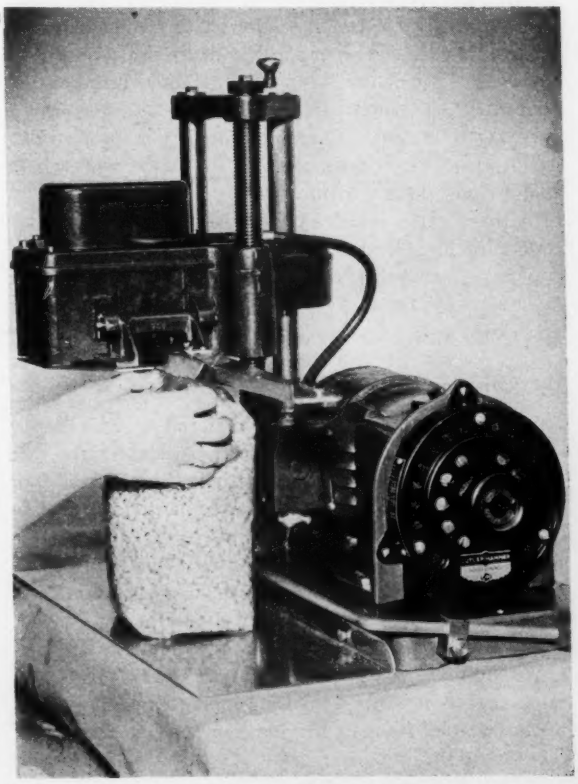
Many people consider the indentations in a heat seal to be there for a decorative effect and many packers of heat-seal bags have selected crimpings or configurations for appearance rather than utility. On a heat-seal package, these indentations are widely termed "crimps," with the result that many bag-sealing machines are called "crimpers."

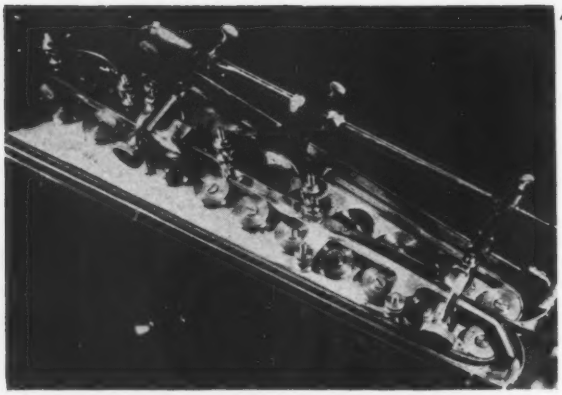
The question of whether or not to crimp, the directions in which the crimp should run, the angle and pitch of the crimping teeth are all determined by the type of material being heat sealed and the end result the crimping is supposed to accomplish.

As a general rule, flat jaws or rollers (that is, without crimping teeth) should be used on paper or cloth on which a heat-sealing coating has been applied. The paper or cloth generally resists the crimping action and has a tendency to flatten out when the heat and pressure are removed. If for any reason paper material has to be crimped, care should be taken to see that the crimps are

3. Semi-automatic rotary sealer; operator guides bag to the sealing rollers. Photo Wrap-Ade Machine Co., Inc.

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4. A high-speed mechanical sealer of the rotary type. Bags traveling on belt conveyor are fed into the machine by an operator. Photo Amsco Packaging Machinery, Inc.

so arranged that they will run parallel to the grain of the paper.

Cellulose materials are capable of being stretched under heat and pressure and a crimp seal on such material is stronger than a flat seal. These materials will stand a fairly severe angle in the crimping teeth, a 90 deg. included angle being widely used.

Mounted heat-sealing foil can be crimped, provided the pitch of the teeth is not too coarse and the included angle of the teeth is not less than 130 degrees.

Laminated materials, other than cellulose sheets, should not be crimped, as their thickness is such that the crimping action does not reach the surfaces which are to be heat sealed.

Crimping teeth are commonly cut in three directions. The first is called a vertical crimp and the crimps are parallel to the sides of the bag. The horizontal crimp runs across the top of the bag. The diagonal crimp is described by its name. The strongest seal is made by a vertical crimp, but this type of seal is not liquid-tight. The horizontal or diagonal crimp should be used where liquid tightness is a requirement.

Ordinarily the width of a seal should not be greater than 1 inch. One-half in. to $^3/_4$ in. is generally wide enough. It should be remembered that in a given sealing machine, as the area of the seal is increased, the pressure per square inch is lessened.

Bag materials

Bags are no stronger than the material of which they are made. Each material has a certain useful life and care should be taken to see that bags which have lived half their lives in a warehouse or storeroom are not used in critical packages. It should be realized that the cost of a bag is a small factor in the cost of the completed, delivered package. There are some converters who make their bags to a high standard and they should be encouraged. Bags should be used in the order in which they are purchased; the first bags into a plant are the first bags out. Bags should be stored under proper temperature and humidity conditions as this will increase the period of their useful life.

Bag loading

The usual way of getting an article or product into a bag is to open the bag and place or drop the article into it. This method has been used since bags were first made, but it is not recommended for large bags. A suggested method is to place the product to be bagged on a tray, the dimensions of which are somewhat less than the inside dimensions of the bag. This tray has to be supported above a table in such a way that the bag can be slipped over the tray upon which the object rests. One end of the tray serves as a "shoe horn" and permits the bag to be slid over the tray in such a way that the bag is not injured. The bag and contents are then slid off the tray. This method is necessary when the bag is to hold a number of objects and hold each object in fixed relation one to the other. This method is also desirable when the weight of the bag contents is such that they might injure the bag in the loading action.

Air exclusion

Having loaded the bag properly, it should then be brought to the bag-sealing machine. Before being sealed, it is absolutely necessary that as much air as possible be excluded from the bag. Enough air must be excluded to permit the bag walls to be free from tension. Otherwise any slight drop or concussion will cause the entrapped air to break out through one of the heat seals of the bag. Means of excluding air are several. One is to pull a partial vacuum on the bag before sealing or to fill the bag with some gas which can escape through the bag walls after it is sealed, or pressure may be exerted against the front and back of the bag so that these surfaces are concave when the bag is sealed. If a liquid or semi-liquid is being sealed in the bag, it is often possible to raise the load line by exerting pressure on the exterior of the bag and in so doing exclude part of the air which would normally be between the load line and the bag seal. Too much emphasis cannot be placed on this air-exclusion operation.

Combination and double packages

The bag-and-carton package consists of a heat-seal bag in a carton. The bag offers protection to the product while the carton protects the bag and carries the load. To make sure there is no weight against the bag surfaces, the bag should be larger than the inside of the box. This insures that each part does only its own job.

The bag-in-box package can be divided into two types. The first can be called a *combination package* because the bag is of such type and material that it must be assembled with the box before being loaded. This combined package must be handled manually in the filling, the bag-sealing and in all of the carton-closing operations. This is awkward unless one end of the carton has been closed by gluing, an operation which can be performed on a certain top or bottom-sealing machine. The closing of the carton, after the bag has been heat sealed, cannot be done readily on a carton top or bottom-sealing machine. An example of this type of package is found in some of the 30-lb. frozen egg packs.

The second type can be called the *double package*. It consists of a bag-in-a-box, but the bag itself is of such type and materials that it is strong enough to be handled as a single package. It can be opened, loaded and sealed by itself. It is then inserted into a carton, which carton can then be glued automatically on an adjustable carton sealing machine. Many of the 5-oz. egg powder packages, millions of which have been shipped on Lend-Lease, are double packages.

Sealing by electronics

A recent development promises to employ radio-frequency power to good advantage in the packaging field, particularly with respect to heat sealing. Experimental equipment has been produced by the Radio Corp. of America, Camden, N. J., which bears out these promises. The unit consists of a radio-frequency transmitter which generates the power, applied by means of a mechanism that resembles a sewing machine.

This transmitter connects to an ordinary 110-volt A.C. circuit and raises the frequency to as high as 60,000,000 cycles with control of the voltage. To operate the experimental unit requires a 50-watt transmitter, but the principle is applicable in units with a maximum of 15,000 watts. The material to be heat sealed is placed between two electrodes of the machine attachment, and the heat—through the action of the radio frequency power—is generated in the material and is therefore maximum at their interface, that is, where the two surfaces meet.

This principle contrasts with the ordinary heat-sealing method in that the latter operates by the penetration of the heat through the film. This means that the maximum heat is applied at the outer surface instead of where the two surfaces meet, and it diminishes as it approaches the interface. This calls for accurate control of the three factors in heat sealing, namely, temperature, time and pressure.

Practically all existing equipment utilizes electrically heated plates or bars which clamp together the two films to be sealed. The heat is thermostatically controlled and the surfaces of the plates may vary from 100 deg. to 500 deg. F. But the setting of the thermostat by no means insures maintenance of the proper temperature, due to the fact that the heating plates may cool as successive pieces of material are operated upon.

The electrodes are not heated at all—they are placed so that the current passes from one to the other through the dielectric material which is being sealed, with instantaneous and uniform heat throughout the material. At the spot where the two surfaces meet, the thermoplastic coating is fused or welded into a heat seal.

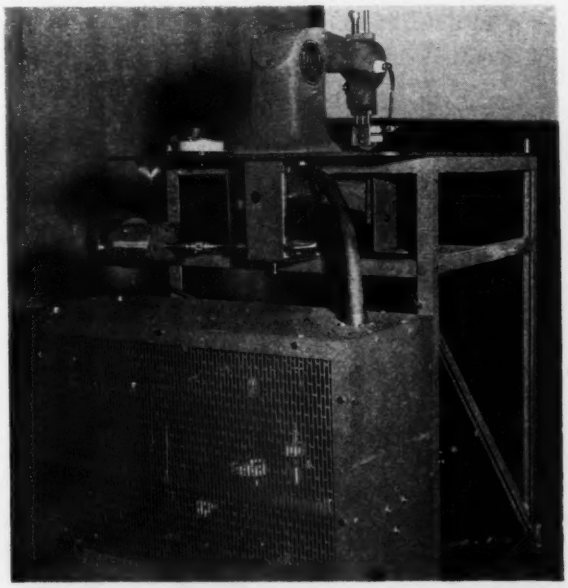
The principle of radio-frequency heating has many possible applications, as in the molding of plastic materials and in wood laminations. Its chief interest for packagers, so far as can be predicted now, will doubtless be in heat sealing of containers made of materials which have been developed since the critical shortages of tin and other important substances have occurred.

The new electronic machine applies the power at the meeting point of the two metal wheels or electrodes which are made to revolve by means of a small motor. The material passes between these wheels in much the same manner as cloth goes through a sewing machine but instead of stitching a seam the material is fused together. It is believed that there may be some considerable advance in the accuracy of temperature control with radio frequency power, and that the time and pressure elements which are largely a matter of mechanics can be regulated as independent functions

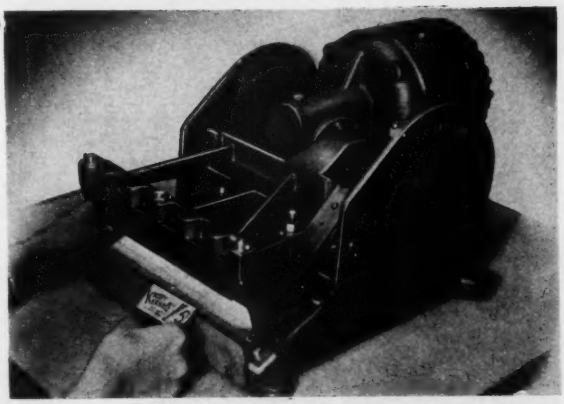
Not all materials can be heat sealed by this method. Prime requirement is that the substance must be dielectric or non-conductive. Rubber hydrochloride sheeting by this method forms what appears to be an utmost perfect seal. On the other hand, metal foil, being a conductor of electricity, is not in the slightest degree affected even when coated with heat-sealing compound. Coated glassine and coated vegetable parchment both appear to seal quite effectively, whereas cellophane and waxed papers are not so successful.

5. Rotary electronic sealing machine (an experimental model) has a power-transmitter unit. Photo Radio Corp. of America. 6. Jaw-type sealer which is used on combination or double packages. Photo Wrap-Ade Machine Co., Inc.

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Carton loading & closing equipment

Cartoning machinery, as we refer to it in this article, includes machines, which, in general, feed a collapsed carton from a magazine, expand it, insert a solid item or a number of solid items into the carton and then close the carton. Among the items normally packaged on cartoning machines are tubes of tooth paste, shaving cream, etc.—bottles, jars, razor blades, candy-coated gum, rubber jar rings, bouillon cubes and many other miscellaneous items, including printed matter. Generally speaking, the type of cartoning machine under discussion is rarely or never used in connection with dry, free-flowing items such as coffee, cereals, etc., which need to be weighed before they are inserted into cartons. For this type of equipment see "Weighing and Filling Dry Products."

When to use machines

Whether or not a prospective purchaser of cartoning machines or a producer of cartoned products is warranted in planning for the use of cartoning machinery depends upon a number of factors. First, of course, there is the matter of the number of packages he is required to produce daily or weekly. Secondly, there is the nature of his package.

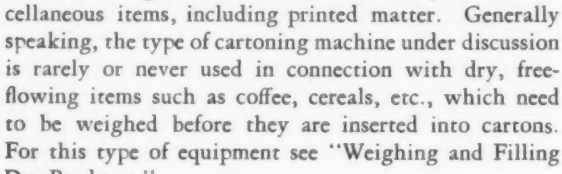
There are some cartoned products which can be packaged quite economically by hand. Others, because of their more involved nature, are prohibitively expensive to produce by hand. The best procedure involves the submission of packages to carton machinery suppliers who can, after a study of all the factors involved, recommend either an existing machine in their lines or advise concerning the modification of one of these machines to suit the job at hand.

Types of cartons to use

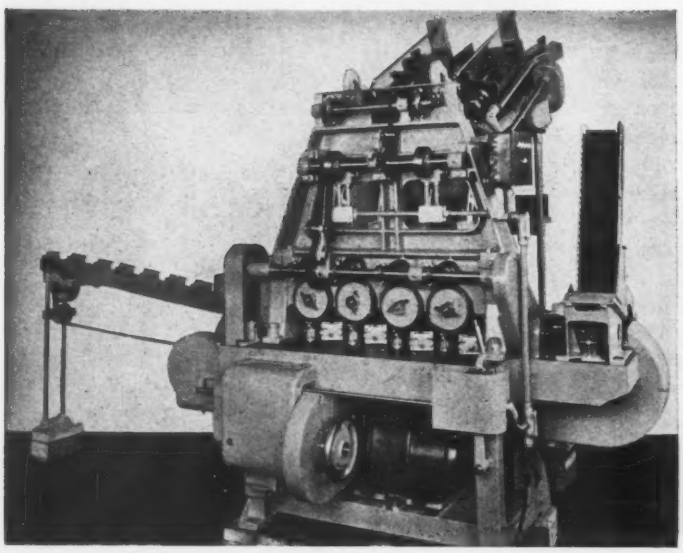
In general, there are two types of cartons which are handled by automatic cartoning machinery. Most commonly used is the tucked carton equipped with top and bottom flaps which are tucked into position by the fingers of the cartoning machine. The other type is what is known as the glue-end carton. This is used in cases where tamperproof seal is desired or where the weight of the product would open the bottom tucks of the tucked type. In some instances, cartons are used with a combination of glued flaps at the bottom and tucks at the top. A third type is the die-cut but unglued carton which is set up and closed automatically. This type is used for the packaging of crackers, lard, shortening and other similar products.

What can be cartoned

The variety of cartoned products is tremendously broad. Packages of razor blades stand, perhaps, at the end of the size scale. From this point, they range upwards to the large cartons which are used for macaroni or for cleansing tissues.



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1. Automatic carton folding and closing machine. Photo Peters Machinery Co. 2. A .30-calibre box loader with automatic hopper feed. Photo Package Machinery Co. 3. Box loader for .30-calibre cartridges. Photo New Jersey Machine Corp.

Machine speeds

The efficient speeds at which cartoning machines now operate depend to a great extent on the nature of the product to be handled and the size of the package. Several well-known five-cent packages of candy-coated chewing gum, containing twelve tablets, are automatically produced on machines that operate at speeds of 100 to 160 packages per minute. Safety razor blades are automatically counted out and cartoned at speeds as high as 240 packages per minute. Bars of soap and similar products are automatically cartoned at speeds of 150 or sometimes more per minute.

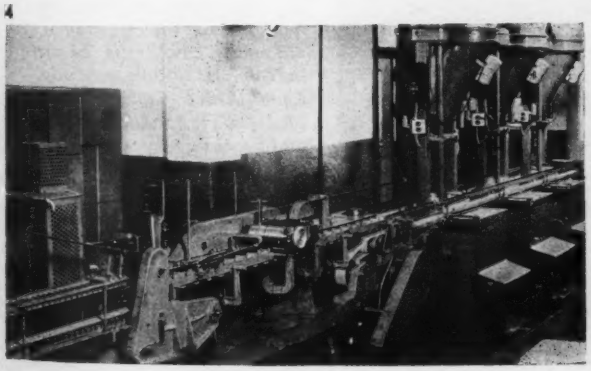
New box loaders for war jobs

New machines in this group have been invented to perform war jobs, and some of them may well find a place in the world of reconversion. There are, for example, machines which load ammunition into standard boxes at a great saving in man-hours over the methods formerly employed.

One of the most interesting of these is a .30-calibre box loader with an automatic hopper feed. In this case cartons are made with a special liner in cardboard sections so that each cartridge is kept separate. The cartridges are dumped into a hopper at the upper end of an inclined chute from which they slide down into runways. After being aligned, the cartridges are fed into guides which curve downwards so that the cartridges are brought into a position where they are pointing horizantally. From this position, they are fed into the machine proper. There are in all, four complete stations on this carton loader, each comprising a hopper, a first and second pocket-wheel combination, a chain lug pusher and a transport pusher. The set-up cartons with separators are fed into an inclined magazine feed by an operator who stands behind the machine. The carton-carrying chain runs continuously, and at the end of the operation the filled cartons land upright or on end on a belt discharge with high side guides.

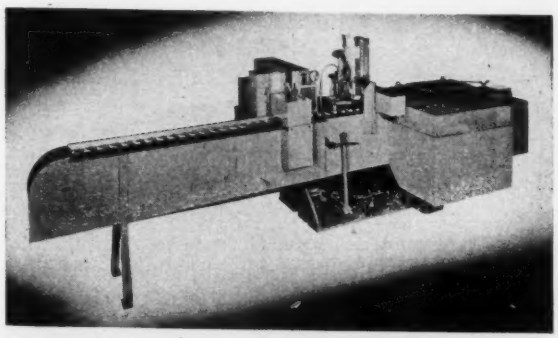
4. This automatic carton feeding and sealing machine can be used for the packaging of powdered eggs. When it is assembled on a production line, as it is here, it can be coupled with automatic feeding units, three of which are shown in background. Photo Stokes & Smith Co.

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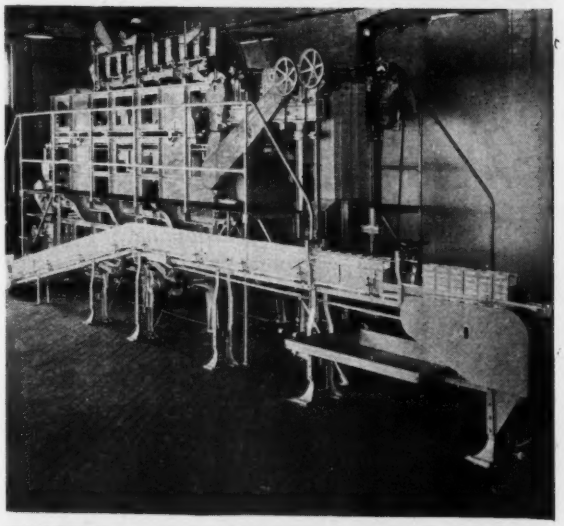


5. High-speed, automatic cartoning machine equipped with mechanism for folding and inserting a circular in the carton. Photo F. B. Redington Co. 6. Feeder end of a flat-carton feeder, liner and bottom maker which handles cartons at the rate of 90 per minute. Photo Battle Creek Bread Wrapping Machine Co. 7. Fully automatic cartoning machine for double-edged razor blades. Photo U. S. Automatic Box Machinery Co., Inc.

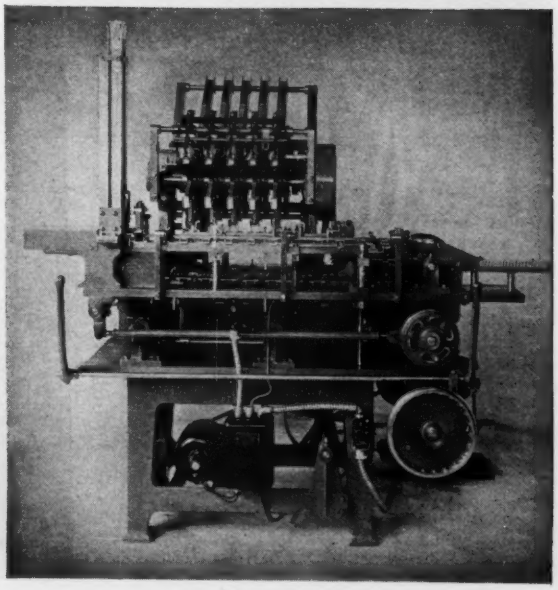
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Collapsible tube filling

Selection of proper tube-filling equipment depends upon three important factors: the consistency of the material, the range of tube sizes, daily production.

Liquids and semi-liquids that are self-leveling and will flow by gravity are the least difficult to handle as the material will run into the tube from the top, will fill uniformly and will be free of air bubbles. Furthermore, the material can be easily fed to the hopper of the machine and will flow down through the hopper, by gravity, into the filling mechanism. Tooth pastes, shaving creams and similar materials that will not flow by gravity must be filled by placing the filling nozzle down into the bottom of the tube and filling from the bottom up to prevent air pockets. In most cases, the filling pump will pull the material down into the hopper, but if the material is "short" and breaks apart, an impeller-type agitator must be used to force it down through the hopper. Creams, ointments and similar pastes that will not flow by gravity can sometimes be made to flow by warming them. The machine, in this case, is equipped with a jacketed hopper and an agitator to keep the material at a uniform temperature and it is also equipped with heated filling parts. Before adopting this method, it is important to determine whether the material shrinks on cooling, as any shrinkage will draw the walls of the tube in and give it an empty appearance.

The majority of the machines on the market will handle tubes up to $1^1/_2$ in. in diameter by 6 in. long and many of them will handle tubes up to $1^1/_2$ in. in diameter by 7 in. long. Hand-operated equipment will handle somewhat larger tubes, but the semi-automatic and automatic machines must be modified to handle tubes over 7 in. in length.

The production requirements will, of course, determine whether hand-operated, semi-automatic or full automatic machines should be used. All are available and range in capacity from 100 or less up to 7000 an hour.

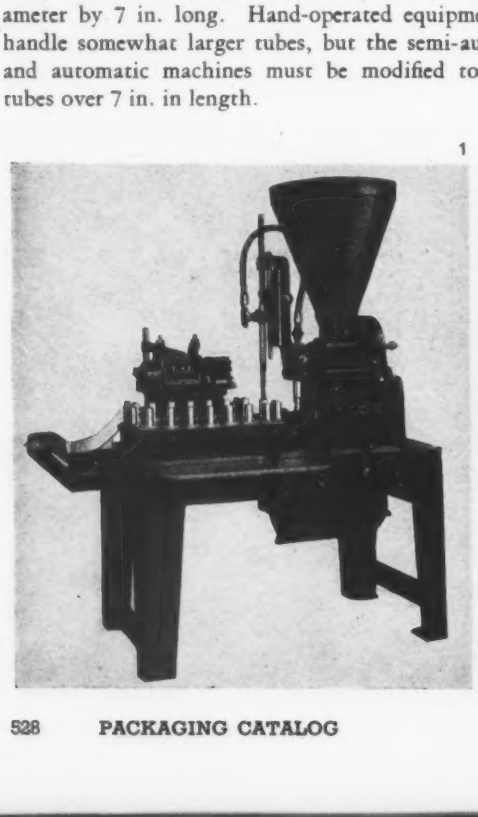
Machine types

A complete outfit for filling, closing and clipping collapsible tubes may be purchased for as little as $275 and will put up from 10 to 20 tubes per minute, using three operators. Two types of hand-operated filling machines are available, one for liquids and semi-liquids and the other for pastes. Both are easily adjustable and both fill the tubes as accurately and as cleanly as do power-driven, automatic equipment. The filled tubes are then transferred to a small, hand-operated folding machine which applies a double fold or which can be furnished to apply the quadruple fold. A third operator indents the folds such as on clipless closures, or clamps on a clip, by means of a foot-operated press. Certain models can be equipped with electrically heated jaws for applying the hermetic seal described below.

A production of about 30 filled and sealed tubes per minute can be had by using a general purpose filling machine and then transferring the tubes to a second machine which folds the ends and seals them. Two operators are needed. In the case of liquids, it is possible to put a filling attachment directly on to the folding and sealing machine, in which case one operator can fill, fold and seal up to 30 tubes per minute. These machines can be equipped with variable speed drive, so that the speed of the machine can be adjusted for individual jobs.

For the manufacturer who has a varied line of products, several makes of completely automatic tube-filling,

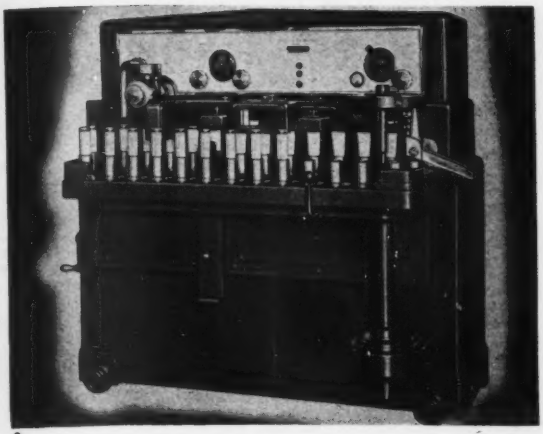
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1. Automatic machine for tooth pastes, shaving creams, ointments, etc. Fills, closes and crimps automatically. Photo Arthur Colton Co. 2. Machine for handling liquids, ointments or pastes at a rate of 25 tubes per minute. One operator is required. Photo F. J. Stokes Machine Co.



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3. "High-speed filler designed to fold the tube and, after filling, apply a welded seal. Photo, The Karl Kiefer Machine Co. 4. Collapsible-tube filling, folding and crimping machine. Photo, Arenco Machine Co., Inc.

closing and sealing machines are available which will handle up to 50 tubes per minute with one operator. These machines will handle both pastes and liquids, since the tubes are raised up over the filling nozzle and are filled from the bottom up. The machines can be set to make a plain double fold, a quadruple clipless fold or the hermetic seal. The operator simply places the tubes into the tube cup and registers them so that the trademark or printed matter on the tube will be in proper relation to the fold. Ejection is automatic onto a conveyor.

A full automatic machine is available with four filling heads capable of filling up to 120 tubes per minute. This machine automatically removes the tubes from the shipping cartons, registers the printed matter by means of a photo-electric cell and fills, closes and discharges.

The simplest type of closure is a plain double fold. This is neat and attractive in appearance and is sufficiently strong for materials, such as rubber cement and glues, that automatically harden and prevent further seepage in the event they leak through the fold. It is also satisfactory for thin pastes and similar materials that are easily extruded and do not strain the fold when forced out of the top of the tube. This double fold can be strengthened considerably by indenting the metal.

Clipless closures

The so-called clipless closure consists of a quadruple fold, reinforced by corrugations. The ten layers of metal that result are as strong as a clip and considerably more resistant to seepage and leaks.

When the tube is folded, the walls come together and give the tube a wedge-like appearance. The volume of the tube is reduced considerably and the material is forced up toward the fold. For this reason, tubes must not be filled more than about $^3/_4$ or $^7/_8$ full.

Substitute tubes

If collapsible tubes of substitute materials come into common use—and those who are developing them are confident that will be the case—filling and closing equipment will need to be modified somewhat. One company has developed a device or change-part to heat seal the clipless closure. Careful temperature control is required. One material calls for temperatures of 110 to 120 deg. F. Higher temperatures will melt the substance, while lower temperatures fail to form the seal.

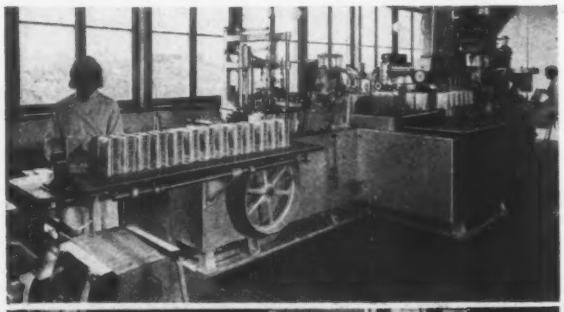
The alternative is a metal clip-type closure. For this type, the machines must be adapted so as to overcome the natural rebound of the material of which the tube is made. The all-metal tube is ductile and holds its shape when the pressure is exerted in applying the clip. But this is not the case with a tube made of a substance which springs into its original shape.

The spattering of material on the inside closure wall before closing is often the reason why the material seeps through the closure. The spattering in turn is frequently caused by drip from the filling nozzle. There are several machines on the market today using different methods for eliminating the drip from the nozzle—one by blowing the drip into the tube, and the other by sucking the drip up in the filling nozzle. Both methods effectively aid in keeping the closure walls clean.

If the material is such that dripping cannot be avoided, or if it creeps badly, there are means for coating the inside closure wall and subsequent application of heat produces a perfectly sealed closure. During the past few years several methods for welding the tube closure have been developed and are in use today. Such closures will then be hermetically sealed.

One type of machine is equipped with automatic cap tightening and tube cleaning and has the no-tube, no-fill feature. For coding purposes the closures can on some machines be imprinted with numbers or characters.

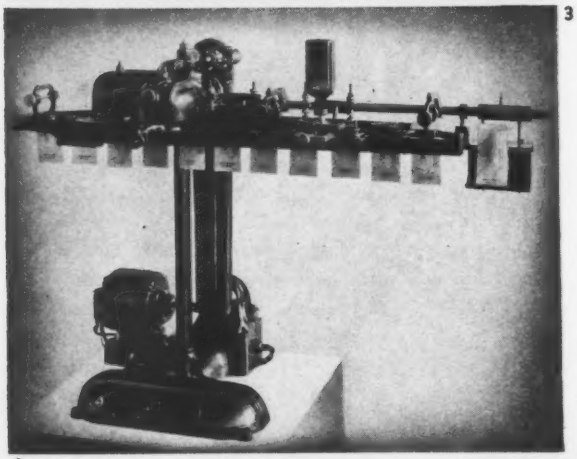
Bag filling & sealing



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Since, for a number of years, automatic and semi automatic equipment has been available for the efficient closing of stiff containers, it was until recently almost imperative for the large producer of packaged goods to seek some such stiff container as a can or a carton for the packaging of his product. Although the cost of the stiff container was considerably higher than that of the paper bag, the saving in production cost frequently more than equalized the excess cost of the package itself. Thus, in most cases, the bag could be used only by the small producer who utilized hand operations or combined hand or semi-mechanized bag opening and sealing operations with semi-mechanized or automatic filling.*

Today, however, the picture is changed. Automatic machinery for bag filling and sealing is available which can perform one or all of the necessary operations. The machines can feed the bags, form them, open them, fill them, check-weigh, and they can close and seal the bags.

Automatic bag-making machines

Automatic machines for the manufacture of bags and envelopes usually make bags with center seals and with bottoms which are folded up or crimp sealed. The equip-

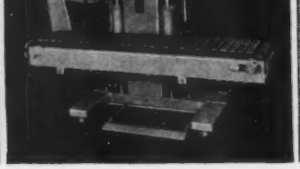
* See also "Specialty Flexible Containers," page 169; "Merchandise Envelopes and Packets," page 175; "Bag Sealing and Closing," page 185.

1. Automatic bag-filling, weighing and sealing machine for flour, sugar, etc. It prescores bags, bulk weighs, bulk fills and dribble-feed weighs. A check-weighing apparatus throws out over- and under-weight packages. Bags are sealed by gummed strip over triple-folded top. Photo Arenco Machine Co., Inc. 2. Shaker-type weigher for feeding, weighing and filling potato chips in bags. Bags are shaken during filling. Photo Triangle Package Machinery Co. 3. Rotary-type bag sealer for varied materials and sealing methods. Photo Amsco Packaging Machinery Co. 4. Machine, similar to above, for sealing soup-mix. Photo Amsco Packaging Machinery Co. 5. Machine for bulk packing of large bags. Photo Bagpak, Inc. 6. Automatic bag-opener, feeder and weigher attains speed of 30 bags per minute. Photo B. F. Gump Co.

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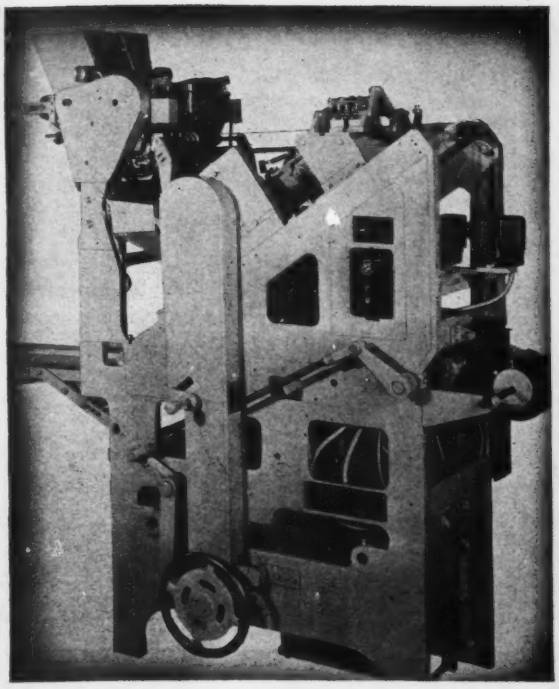


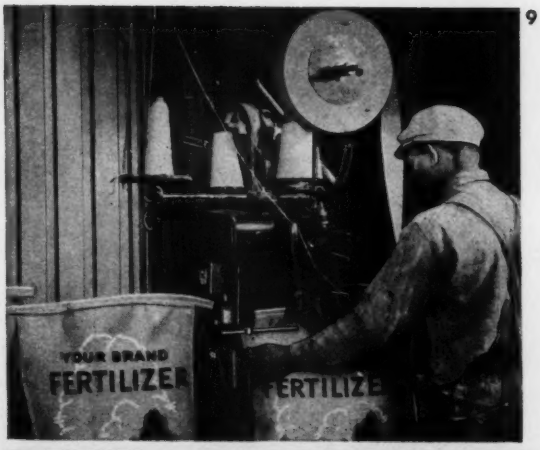
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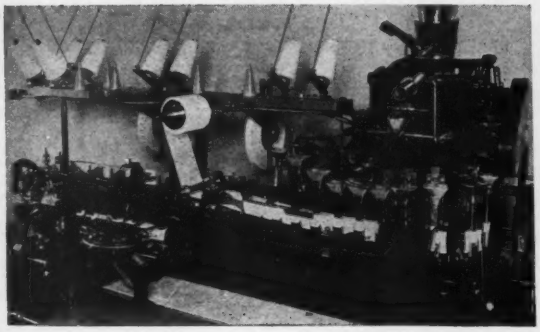


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7. Machine for forming, filling and top sealing of cellophane bags at rate of 45 per minute is equipped with double net weigher. Photo Richard Machine Co. 8. Tea-bagging machine which forms fabric bags, fills them, sews closure and applies string and tag. Photo Pneumatic Scale Corp., Ltd. 9. Tape sealer, sews heavy cotton cord over closing tape. Handles 12 or more bags per minute. Photo Bemis Bro. Bag Co. 10. Close-up view of the automatic bag-sealer weighing unit and discharge-settling conveyor at the plant of Albert Ehlers Co. This machine is capable of handling 25 to 30 bags per minute. Photo Consolidated Packaging Machinery Corp.

ment can make single and double-wall bags. It can form them of unprinted material or material with continuous or random design, or it can produce spot-printed bags to perfect registration.

A high rate of production is attained by the machines in the manufacture of uniformly produced, perfectly sealed and unusually strong bags. Machines are made in various ranges, some making bags as large as 17 in. wide and 60 in. long.

Such provisions as automatic labeling for custom packing and tube making, are also available.

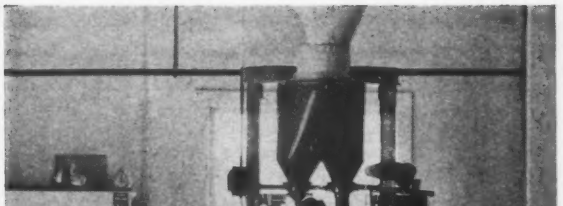
Machines for pouch bags

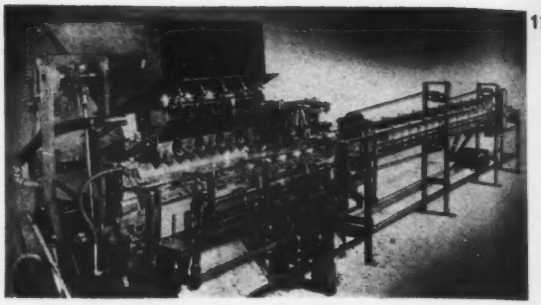
Machines are now obtainable for making pouch bags by one of two methods. Either two rolls are run with sealing surfaces meeting (in which case two parallel and one right-angle seal are made), or one roll is used, the material being folded in half and two parallel edges sealed. For maximum protection, it is sometimes desirable to seal at the point of fold.

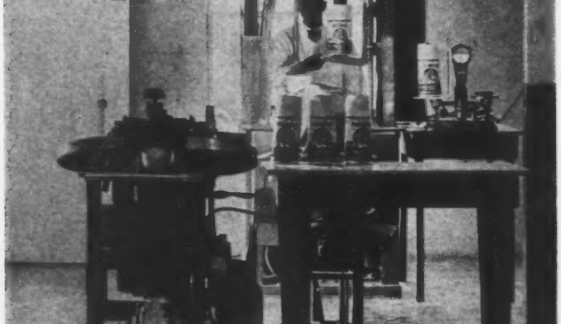
These machines were primarily designed for metal foil and asphalt-laminated stocks, and printed or unprinted material can be handled. Bags as large as 24 in. wide by 60 in. long can be accurately and perfectly made.

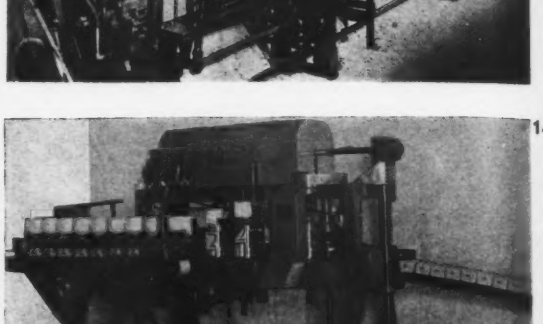
Bag sealing

Rotary-type bag-sealing equipment has met with a great demand because of its high productive capacity and the simplicity of its operation. This type of machine may be used adjacent to filling equipment. Thus filling and









11. Duplex bag packer and weigher (in background) feeding to an automatic bag-sealing machine. Photo Stokes & Smith Co. 12. Machine for weighing and filling prunes and miscellaneous dry fruits into cellophane bags. Photo Triangle Package Machinery Co. 13. Automatic bag-feeding, weighing and filling, top folding and gluing machine. Photo U. S. Automatic Box Machinery Co. 14. Bag-closing machine handling folded gusset bags. Operation includes adding and sealing tin tie. Photo Benj. C. Betner Co. 15. Coffee-packing machine which fills, weighs and seals bags with gummed tape (Arenco closure). Photo Arenco Machine Co., Inc.

sealing, though two distinctly separate functions, can be combined into an operation which can be performed by but one operator without any loss of speed. The rotary machine may be used in conjunction with belt conveyors for the maximum utilization of its capacity. In many such cases, no operators at all are required.

These machines are available in models adaptable to all materials whether they be glue or heat-sealed.

For war matériel

For the specialized packaging of war matériel in pouch-type bags, supplementary equipment has been designed. These make it possible to open, form, fill and seal the bags on a straight-line, high-speed basis with extreme care in the handling of the matérial.

In addition, such provisions as roller conveyors, belt conveyors, air extractors complete the efficient handling of otherwise difficult bag-packaging work.

Decorative possibilities

The introduction of automatic bag-packaging machinery has, in some industries, resulted in a surprising change in the appearance of the bag itself, for the automatic machine is capable of producing a bag closely approaching in appearance the neatness and attractiveness of the finest stiff containers. With these design potentialities to work with, bag suppliers and bag users have turned from the cruder forms of bag decoration to the use of the more attractive and decorative outer bag materials.

Developed in almost every case to meet the specialized needs of a single producer or industry, these machines have come to form a group in themselves.

Inspection on the production line

by H. A. Sumner

Inspection on the production line is only part of the whole picture of quality control. First, it is necessary to have a quality-conscious organization. Standards of quality must be arrived at, points of control established, personnel selected, adequately trained and organized. Full advantage should be taken of all the mechanical aids existing, and new ones must be searched out. But unless thorough inspection and control are exercised from the time of the receipt of raw materials till the shipment of the manufactured merchandise, inspection on the production line is almost useless.

From doorman to president, the whole organization must be quality conscious, a complaint from a customer viewed as a calamity. Good housekeeping helps establish this atmosphere. Then, too, the personnel department must understand the quality problem and exercise the same control in the selection of workers as a chemical laboratory uses in the acceptance of raw materials.

Points of inspection

The selection of points of inspection is a technical matter which the plant engineer, the production manager or whoever is responsible for quality should work out very carefully. In order to reduce waste, it is desirable to detect any defect at the earliest possible moment. It is also desirable to be sure that the finished product is perfect in every respect. The problem requires rather careful study of the processes and a balancing of the risks against the expenditure involved. Too much inspection is apt to prove ineffective in the long run. On the other hand, many production executives have discovered to their sorrow that they cannot economize at the expense of inspection. The idea that because an inspector does not appear to be very busy he can just as well do a few other off jobs is erroneous.

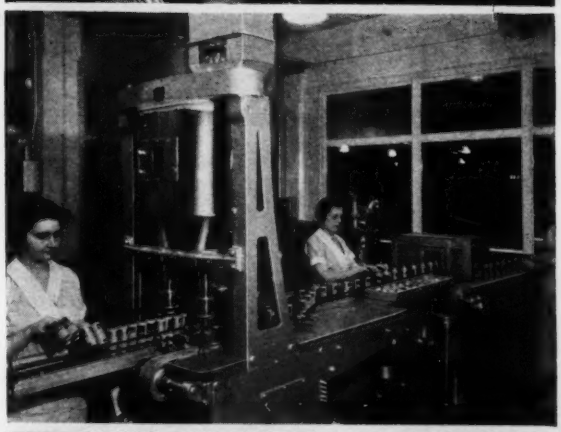
Organization of inspection personnel

The organization of inspection personnel offers a problem, and the same solution does not fit every condition. The type of person, however, who makes a good inspector is the same in every plant. He is, of course, extremely conscious of his responsibility; his technical knowledge must be of the best; he must be careful, painstaking and proud. In addition to this, he must be tactful and understanding. An arbitrary and disagreeable inspector can do more to wreck the quality of a production line than almost any other single element. It is not easy to find a person who meets these specifications, and it is

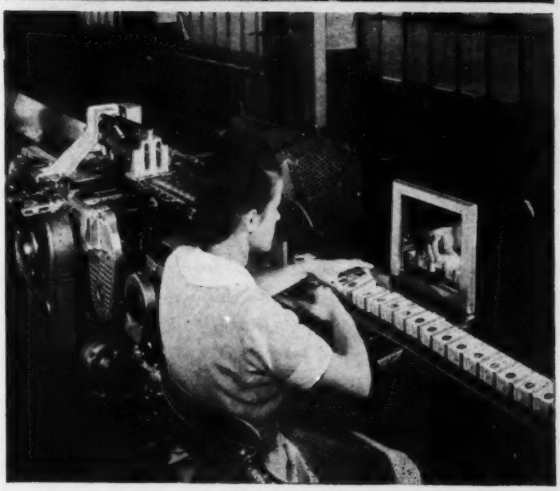
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1. Pressman carefully checking the quality of printed matter in production. 2. The operator at extreme right is inspecting completed packages before packing. 3. Method of package inspection using a mirror to examine both ends. All photos Norwich Pharmacal Co.



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4. The inspection of cartons of cosmetics before they are packed helps to insure the delivery of the product in good condition, prevents consumer complaints. 5. The operator in the center front is inspecting packages as they pass along the assembly line. Those which are imperfect can easily be rejected at this point before packing. 6. After they are labeled, the products are carefully inspected. All photos Norwich Pharmacal Co.

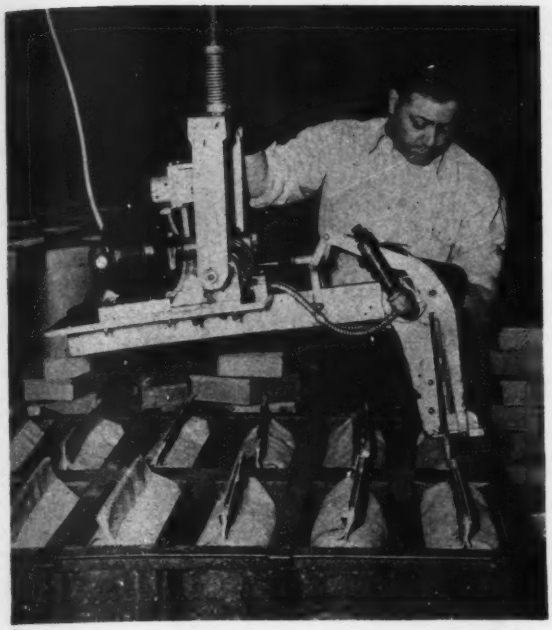
the management's function to provide the training and the encouragement to develop this type of individual. Either the personnel department, the training department or the production manager must shoulder this.

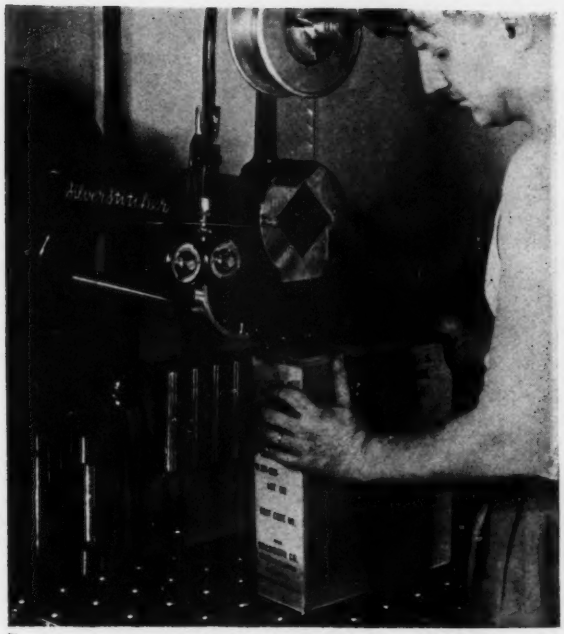
How should inspectors be organized? Should there be a separate inspection department under a chief inspector who is responsible for quality and responsible only for quality, or should the responsibility be left to the foreman of the production line or to the department or division head? My belief is that even in large organizations an inspection department which maintains inspection on production lines and can over-ride the department head is a dangerous set-up inviting conflict. However, the line foreman, even though he is imbued with a good sense of quality, is under such pressure for production that he is very apt to accept results incompatible with good quality. On the other hand, the division or department head if he is big enough for his job, should certainly know very definitely the relative importance of quantity and quality. He should know that the easiest and quickest way to remedy a defect is not to limp along and accept a high percentage of rejects, but to stop the production line, correct the trouble as soon as he can.

In view of this, it has been my experience that if production line inspectors are made responsible directly to the department head and are given authority to insist that a line be closed down if the quality is poor, very excellent results are obtained. Of course, occasionally a conflict may arise between inspector and line foreman, but the tact of the inspector and the judgment and diplomacy of the division head can easily smooth the situation. If the whole personnel, including the line foremen, is sufficiently sold on the quality theme, such conflicts will be very much less frequent. Of course, definite responsibility for the quality must rest with the inspector and the department head, and means be provided of placing this responsibility if failure occurs.

Tools of inspection

The tools of inspection are important and becoming more so. The war situation has developed a number of devices which assist the human inspector to do his job better and more quickly or eliminate the human element altogether. Automatic weighing and sorting devices have been in use for a long time, although some very clever new ideas are making their appearance. Electronics are providing the quality engineer with really miraculous tools. It is hopeless to attempt to enumerate the variety of items available to help with the inspection job. There have been so many developments in this field, and it is so important, that the technical societies and trade journals could render great service by collecting and making available to all industry the mass of scattered information and methods of quality control that have been developed. Of course, many of these devices cannot be passed on to industry as a whole until after the war, but manufacturers interested in strengthening their inspection systems should certainly investigate at length developments of the past few years.





1. Multiwall paper bags sealed by automatic stapling device where tops of bags are headed with cardboard reinforcement. Photo Bostitch, Inc. 2. Machine for seam-stitching shipping containers. Photo Acme Steel Co.

Box & bag stapling equipment

The use of stapling, as a means of closure for bags* and boxes, has shown a great development during the past few years, furthered by the wide variety of stapling equipment that has been produced to meet specific requirements. Bag sealing with staples has grown from a spare-time job of retail clerks until whole departments are now devoted to this particular operation. Whereas hand-operated machines were used, and still are, power-driven staplers and stitchers† are effecting great savings in the packing and shipping departments themselves.

Among the advantages of stapling as a method of closure is the fact that it is neat, secure and very fast. It does not impair the appearance of the container and the container may be used immediately, without waiting for an adhesive to set. Dampness does not cause the seal to loosen, with the danger of the contents spilling out, and it is practically impossible to remove the staple and again seal the package without detection, thus reducing the danger of pilferage to a minimum.

Four types of closure are generally used in this bag-sealing work. The simplest form is where the bag is merely folded over at the top and fastened with one or two staples. Another method is the use of a cardboard bag top which folds over the top of the bag and is stapled through the bag, thus making a seal and furnishing a label at the same time. Where the bag is to be folded tightly over the contents, as in the case of a coffee bag, sometimes the two sides are folded in first and then the back and front folds lapped over each other and stapled with a single staple. When a non-sift seal is desired, a wide fold is made across the top of the bag and this fold is folded again, the sides being folded under at the same time. By inserting a stapling machine under the two ends of this fold successively and driving a staple in each end, a flat top, non-sift bag is produced.

Packers of asphalt, fertilizer and other heavy bulk products, who use multiwall paper bags, have discovered that stapling is an efficient and economical means of sealing these bags, too, and bags up to 100 lbs. capacity are handled easily and quickly on equipment especially designed for this purpose.

A very recent development in packaging is the heavy kraft shipping bag, which is used as a shipping container for coffee and other items, carrying 12 or 24 1-lb. bags. This container is especially adapted to motor transportation and is widely used by packers operating their own fleet of trucks. When filled, the sides of these bags are folded in and the back and front are then folded over each other and stapled with a hand-operated or foot-operated machine, depending upon the preference of the packager and upon the requirements of the case in point.

Users of corrugated containers have widely adopted stapling methods. Foot- or motor-operated bottom staplers and stitchers are used to seal the bottom flaps,

* See also "Bag Sealing and Closing," p. 185.
† See also Wire-stitching Machinery, p. 538.



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3. A special type of stitcher used for the closing of heavy-duty multiwall paper bags. Photo Acme Steel Co.

while specially designed top staplers and stitchers are used on the tops. Some of these top staplers make use of a sealing blade which is inserted under the flap and a more modern development is a top sealing stapler which is operated from the outside of the closed container, closing its staple entirely from the outside and requiring the insertion of no sealing blade.

The smallest machines used for bag stapling can be operated in the palm of the hand. There are heavy-duty hand models of larger size, as well as a wide range of foot- and motor-driven machines all the way up to large automatic box stitchers. Complete information is available in the industry and it is an easy matter for the user to obtain the equipment that is exactly suited to the requirements of his particular work.

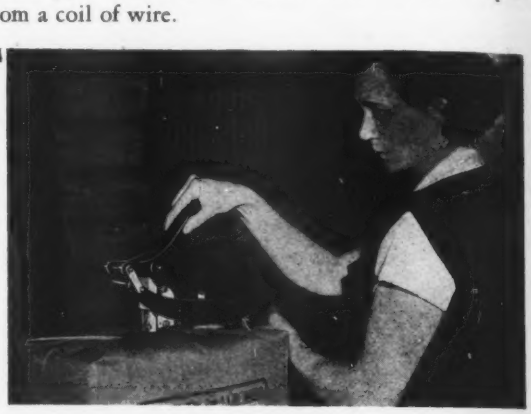
One of the widest uses of stapling in recent years has been in carding for display. Items of merchandise too small to possess sufficient attention-getting power or to carry adequate sales information are stapled to cards which present the message to the consumer. Such cards serve to identify the brand and the manufacturer, to convey a selling message that the article itself is too small to carry and the sales person too busy to tell, to carry directions and explanations that insure the proper use and care of the product, etc.

Practically any item that can be embraced by a staple can be carded in this way. Bottles or other fragile merchandise can be safely and quickly handled, because the pressure of the stapling machine can be accurately controlled without variation and the staple can be firmly clinched with no appreciable pressure whatever on the object being enclosed.

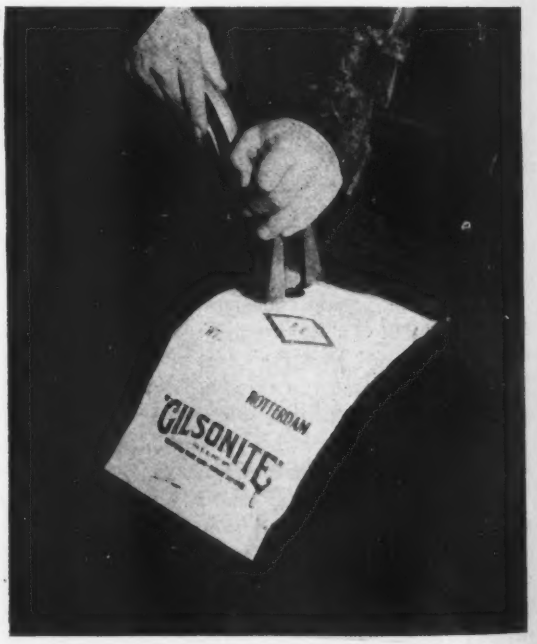
Speed is a big factor in stapling. Whether operated by hand, foot or electric motor, the stapling machine clicks out the staples as fast as the operator can handle the work. Every click completes a stapling operation. It is much faster for most kinds of bagging and carding than tacking, riveting, gluing, hinging, sewing, hooking and taping operations—operations which involve materials of all kinds. There is no waiting for an adhesive to set and the staple will hold regardless of temperature or moisture. Furthermore, stapling machines are portable and can be placed wherever most convenient for the work in hand. For example, in retail stores, where prepackaging is to be done by clerks in odd moments, hand-operated machines are used on each counter where the work is handled. Manufacturers and distributors can better concentrate their work and more often use foot- or motor-driven machines for both packaging and display.

The automatic-feed staple-hammer is also widely employed in packaging and shipping operations. Driving a staple like a double-pointed tack, with each single blow, this hammer is an efficient time saver.

On large production, wire stitchers are often used instead of staplers. A stitcher, in the parlance of the industry, is a machine which makes its own staples from a coil of wire.



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4. Stitcher with an anvil used for the sealing of coffee bags. 5. A hand stapler used for applying linen labels to burlap bags. Photos Bostitch, Inc.

Case packing & sealing equipment

Case packing equipment for the packing of cans consists essentially of a series of inclined runways which receive and gather cans as they roll off the conveyor lines, until the proper number of cans have been assembled to fill one layer in the shipping container. The cans are then pushed, horizontally, into the container by a hand- or electrically-operated device. If the container is of a type to accept more than one layer of cans, this operation is repeated a sufficient number of times.

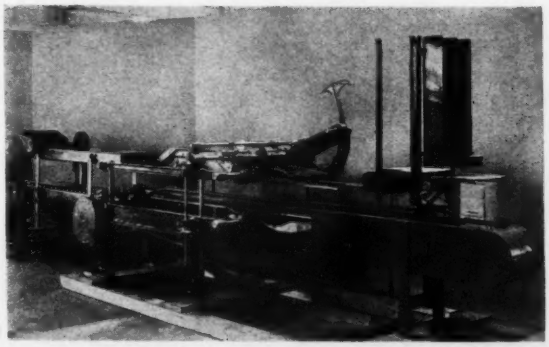
Bottle-casing units work on a similar principle, but use a vertical drop, rather than a horizontal push, to effect entry of the packages into the shipping container. Bottles come off the conveyor lines and are gathered over a grid which correctly positions them. At the proper moment, and under the control of the operator, the bottles drop into the shipping container which has been automatically raised until it rests just under the grid.

Carton packers have also been developed, working on principles very similar to those of the can packer with the exception that the rolling action of the can is replaced by a pushing action to get the various rectangular cartons into the proper position before placing the cans, en masse, into the shipping container.

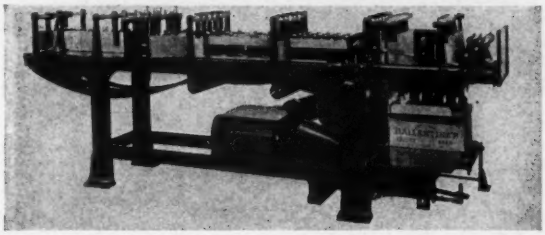
Once packages have been packed—by hand or by machine—it becomes necessary to seal them firmly for shipment. The simplest devices for this purpose are the hand glue sealers, which are simply adjustable pressure units mounted on top of roller conveyor sections through which the hand-glued cases are passed.

Case-gluing and sealing units of an automatic type receive filled, but unglued cases directly from the conveyor line and apply adhesives to both the top and bottom flaps of the cartons with the goods already packed therein. They then fold the flaps into closed position and pass the sealed containers through a compression unit, where the glue sets. Speeds of from 200 to 1,200 cases per hour are practical on such automatic equipment. Such machines may be equipped to seal and glue top flaps only, as in the case of shipping containers for bottled goods which have previously been used to carry the bottles from the glass plant to the packaging plant.

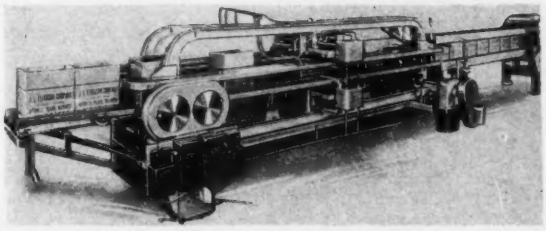
The machines are completely automatic, require no operators and are adjusted to start in motion whenever a case is presented to the machine by the conveyor line. Many machines are equipped with photo-electric cell devices to prevent jamming of cases.



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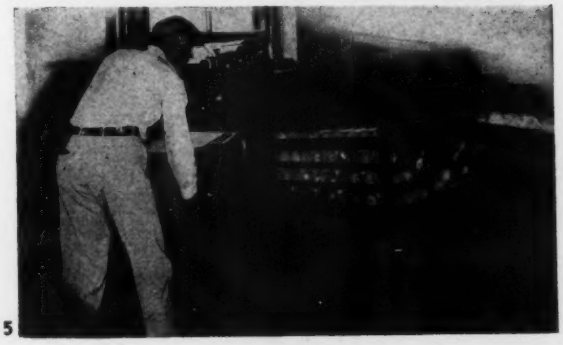
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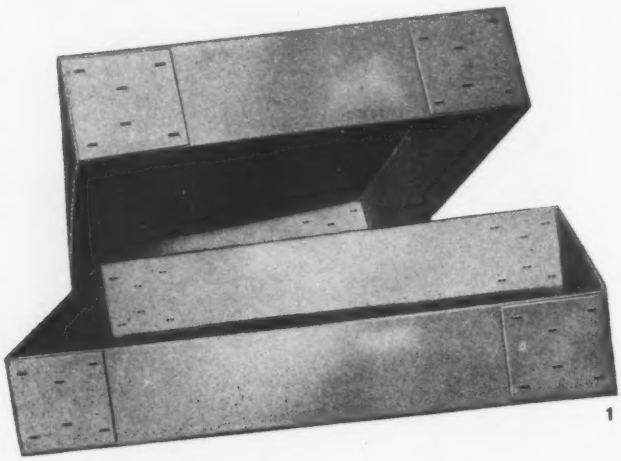


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1. Automatic top and bottom gluer with compression unit. Photo J. L. Ferguson Co. 2. Case loader for beer bottles. Conveyor delivers bottles to grid which positions them. Photo Standard-Knapp Corp. 3. Automatic top and bottom case sealer. Photo J. L. Ferguson Co. 4. Packer and sealer for beer cans and cases. Photo Standard-Knapp Corp. 5. Case loader for cans. Photo Burt Machine Co.

Wire-stitching machinery

by John H. Bliss



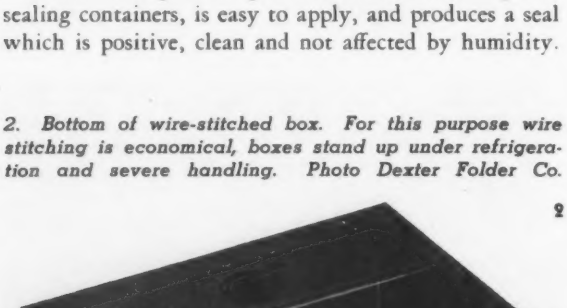
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1. Telescope box, stitched at ends and sides by machine that handles range of sizes. Photo Dexter Folder Co.

World War I pushed the wire staple off the ice and furnished the incentive for engineers to develop new equipment that now leads the world in design and performance. The package age which followed brought about innumerable new uses for this machinery, and whether you are a soldier or civilian, this metal staple performs some part of the service from soup to nuts.

Wire stitching is a rapid method of assembling and sealing containers, is easy to apply, and produces a seal which is positive, clean and not affected by humidity.

2. Bottom of wire-stitched box. For this purpose wire stitching is economical, boxes stand up under refrigeration and severe handling. Photo Dexter Folder Co.



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The process is inexpensive from the standpoint of both labor and materials. There is no waste of time when the box is wire stitched. The wire-stitching machine is particularly successful when floor space is limited and when the package requires a strong positive seal. The container when fastened in this manner is pilferproof, and wire-stitch seals will give the highest grade of service under practically all conditions of packing, storage and shipment. It is little wonder that thousands of shippers and box makers use these machines since average size machine-made staples cost from $1^1/_2¢$ to 6¢ per 1,000.

The wire-stitching machine has been produced in the U. S. A. since about 1885. The modern machine draws the wire from a spool or coil of predetermined length, cuts it off, forms it into a staple shape, then drives it into or through the material and clinches the legs usually inward. The rate of speed at which these operate varies from 200 to 500 stitches per minute.

The popular models of machines are known as box stitchers (with horizontal clinching arm), bottom-stitchers (with vertical clinching posts), regular slotted-container stitchers (with special anvils and tables). It is around these three types that other models are constructed: the top stitchers, combination stitchers, bag stitchers, corner stitchers, etc.

There are also two other styles called multiple-head stitchers (with from two to ten or more stitcher heads) and automatic regular slotted-container stitchers.

Stitcher heads are supplied by most firms driving stitches at right angles to the frame of the machines. They are also available for driving stitches at 45 deg. and in some instances at 90 deg.

Throat lengths of machines vary from 4 in. long up to 50 in. or more depending on the job to be handled. Standard models have been developed for handling the great majority of jobs, particularly with the assembling and sealing of shipping containers.

Many different sizes of stitching wire may be used from which the machine produces wire stitches. The following table gives the popular sizes, the number of feet per pound, the number of staples in a 5- and 10-lb. coil. The wire stitch used in packaging is made from a wire draw varying from 1 in. to $1^1/_2$ in. long.

Size of wire	*Feet per lb.*	*5-lb. coil* *Number of staples*		*10-lb. coil* *Number of staples*	
		1 in.	*1 1/2 in.*	*1 in.*	*1 1/2 in.*
.103 × .017	178	10,680	7,120	21,360	14,240
.103 × .020	146	8,760	5,840	17,520	11,680
.103 × .023	124	7,440	4,960	14,880	9,920
.060 × .024	238	14,280	9,520	28,560	19,040
.060 × .020	277	16,620	11,080	33,240	22,160

Standard stitching wire is a low carbon steel rod, drawn, rolled and in some processes slit into established

sizes. The surface is finished with a coppered, galvanized or tin coating to resist corrosion. Some concerns are offering wire with an enamel coating in various standard colors. Stitching wires have been made of stainless steel, aluminum, bronze and brass where special conditions warrant the extra cost. The total annual tonnage is estimated at about 350 to 400 carloads.

The following sections describe the most popular application of wire-stitching equipment.

Stitching regular slotted containers

The shipping-container industry was among the first to recognize the value of the wire staple. Some positive, inexpensive and fast method was required to fasten the joints of boxes so that this vital part of the container would take the punishment of delivering the contents. A salesman by the name of Fred Crofts developed a clinching anvil known as an open-head device that opened the door to higher machine speed. This anvil permits the folded box to be quickly inserted from where it is stitched and moved out into the completed pile.

A most important development is now in full swing whereby the joints of containers are stitched with semi-automatic stitchers with rubber roll feeds. Within the last two years, elevating machines have been perfected which keep the pile of box blanks at constant levels with the result that old production records were put on the shelf. The machine operator of this combination elevator and stitcher unit folds container blanks and inserts them over the anvil against an electric solenoid switch where the stitcher drives and automatically spaces the staples at the rate of 325 per minute. Where one operator would turn out an average of 2,000 to 3,500 staples hourly during the last war, the latest equipment with one operator will produce 6,500 to 10,000 in the same period. All solid-fibre boxes are wire stitched at the joints, and a large percentage of corrugated containers are fastened by this method.

Wire-stitching machinery is doing a very important job in riveting the joints together of the V-1, V-2 and V-3 shipping boxes. Some of these containers are fitted with sleeves, and they too are stitched at the joint. These boxes must stand up under immersion in water for 24 to 48 hours— many tests were conducted in ocean surfs.

Double-wall corrugated boxes are being stitched at the joints in greater numbers. Stitcher heads which draw wire and produce longer leg staples for handling this thick material are available.

Fibre drums

Limitation orders on steel drums, metal containers, veneer drums, along with the scarcity of wood for barrels, have resulted in the mushroom growth of the fibre-drum industry. The WPB estimates the production has jumped 500 per cent in the short period of 18 months. Here again, with certain designs, the sturdy metal staple was needed for an assembly job where a dependable service was required. Combinations of materials such as wood and fibre, thin steel and fibre are being stitched together for this container. Dry chemicals, cheese, frozen eggs, asphalt, greases, garbage and ash containers and many other items are moving in this new container. The consensus of opinion appears to be that the fibre drum is here to stay. If this proves true, it is probable that better wire-stitching equipment in respect to automatic spacing and greater production will be forthcoming.



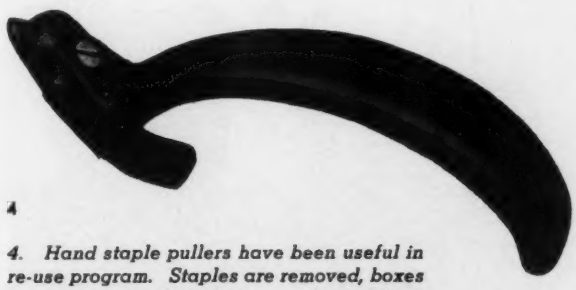
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3. Regular slotted containers were among first to use rapid, secure wire stitching. Photo Dexter Folder Co.

Shippers

The shipper packs his product in the most economical container available from the standpoint of service rendered, customer acceptance and competitive conditions. He can choose one of four methods and materials for sealing the bottoms and tops of one-piece shipping boxes. The wire-stitching method for securing the bottoms of these boxes has enjoyed a remarkable growth because the modern bottom stitcher driving one or two stitches per stroke requires the minimum skill and no adjustment for sizes within a large range. Staples made from a coil of wire are inexpensive—machines are moderate in price. Production is high, in fact this method is considered the most efficient known for sealing bottoms of boxes prior to filling with contents. Bottom-stitched boxes stand up under refrigeration and severe handling conditions.

Top stitching one- and three-piece boxes is a slower process because the filled box must be moved between the application of staples. It is recommended that top flaps be constructed with a 1-in. overlap in order to obtain the highest efficiency. Boxes containing bulk products such as meats, shoes and other articles are top stitched.

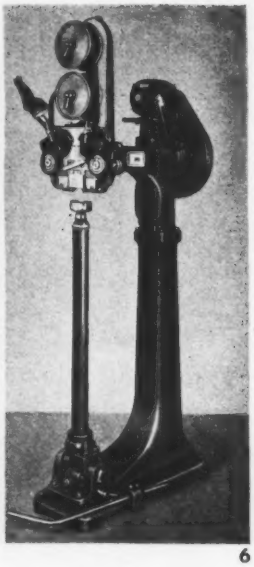


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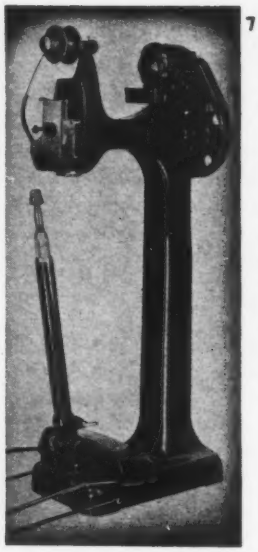
4. Hand staple pullers have been useful in re-use program. Staples are removed, boxes returned to original shippers who use them for 5 to 10 shipments. Photo Dexter Folder Co.



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5. Heavy-duty Bliss box stitcher equipped with horizontal clinching arm. Photo Dexter Folder Co. 6. Bliss bottom stitcher with vertical clinching posts. Photo Dexter Folder Co. 7. Machine which is used for bottom stitching of shipping containers. Photo Morris Division, Harris-Seybold-Potter Co.

Two-piece telescope boxes

Many concerns producing flat, heavy or bulky products use two-piece telescope corrugated or fibre boxes. In practically every instance these are assembled by wire stitching at the ends or sides. No adjustment of the machine is required for handling a large range of sizes.

Three-piece boxes

These containers are assembled on single-head or double-head box stitchers, depending on the style and range of sizes. They are widely used in shipment of fresh and smoked meats and other products where the minimum material and maximum strength are required. This type of container is very popular for the shipment of beverages where the box is used from 10 to 15 times. The wire stitch is a particularly suitable seal for containers subjected to moisture, refrigeration or climatic changes.

Wooden containers

Multiple-head wire stitchers with automatic features are doing their part in assembling several styles of wooden boxes. Some types of citrus fruit containers, vegetable crates and hampers, bushel, quart, pint and hand baskets depend upon the metal staple as a means of fastening.

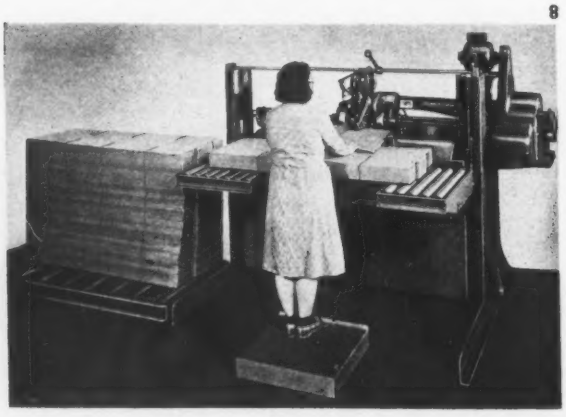
Paper bags

One of the popular methods of sealing small paper bags is with the wire staple. Both single- and multiple-head machines are available for this type work. Some concerns seal paraffin and cellulose bags by the well-known heat treatment and then attach the labels with metal staples. Limited supplies of gasoline for retail store services have brought about an increased demand for shopping bags with two wire-stitched handles.

Re-use program

The Re-use Container Program, as sponsored by the WPB, recommends that wire staples be removed and the box returned to the original shipper where it can be reused. A small hand tool, known as a staple puller, is available for this purpose and some shippers report they are using boxes for from five to ten shipments.

8. Semi-automatic stitcher with elevator. Operator inserts blanks, stitcher drives and spaces 325 staples per minute. 9. Three-piece shipping boxes can be assembled on single- or double-head machines. Photos Dexter Folder Co.



8



9



1. Two main-line belts are used here for straight-line production. The conveyors bring a double line of filled cartons from packing table, deflect them for closing, convey them back to single line and deflect them for loading. Photo Lamson Corp.

Materials-handling equipment

Conveying equipment is the basic part of the high-speed, mass-production process increasingly being called into use to step up our defense needs. It is of vital importance in cutting handling time, avoiding waiting for materials and increasing plant capacity.

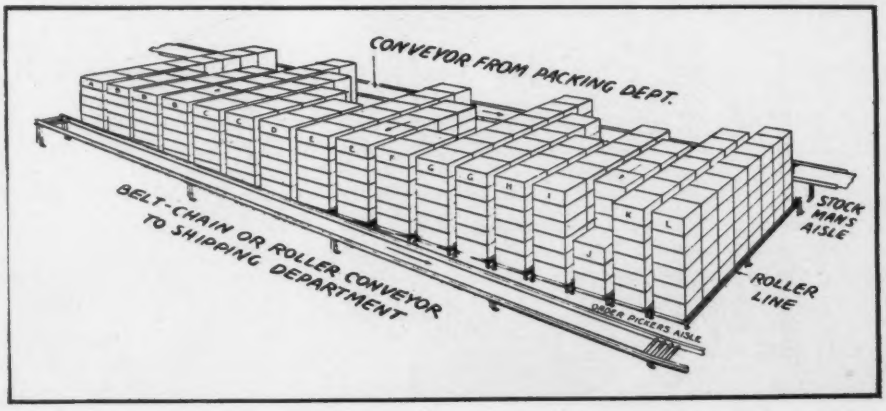
In mechanized materials-handling—as in processing and packaging operations—there is one optimum way for doing every operation and a most effective method of combining operations in a smooth sequence. These call for two distinct but smoothly meshing mechanical systems or, considered in its broadest aspect, of two separate parts of a single mechanized-handling system.

First—the mechanical means used for moving the goods and for insuring a continuous, automatic flow of all ingredients, bottles, boxes, and cartons from the receiving dock, on through the plant and out again.

Second—the mechanical means by which the progress of this flow is so directed and supervised that component parts meet at designated times and places; the materials from each feeder line joining those from every other feeder line and moving along as a single flow.

Experience in thousands of plants has proved that one of the best ways to obtain continuous flow movement is by combinations of conveyor lines so varied in type as to meet such necessary changes in flow direction as horizontal, grade, radius, vertical ascent, vertical descent, two-way, overhead or floor or to meet changes.

Likewise, experience has proved that one of the most



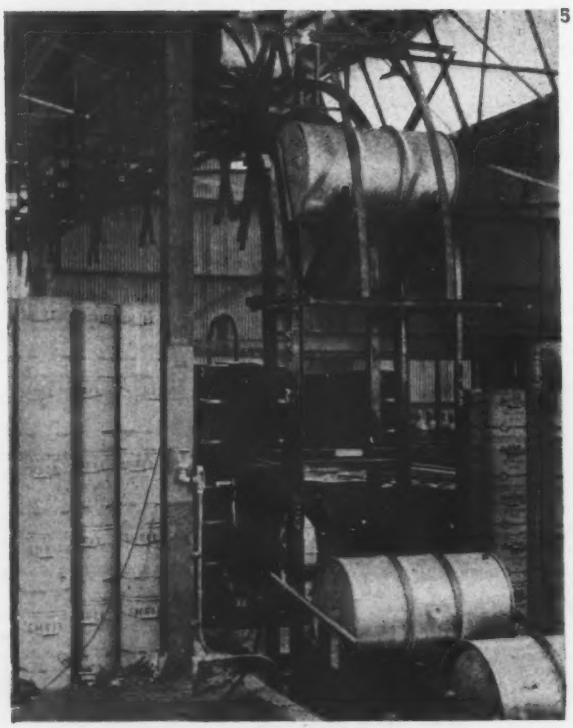
2. This basic principle of stock storage eliminates trucking and handling aisles between piles; increases storage capacity and makes supervision and inventory control easy. Sketch Lamson Corp.



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3. Portable combination piler which has a maximum piling height of 10 to 30 ft. with carrier frames inclined at 45 deg. 4. Pair of 45-deg. inclined boosters automatically receive 72 cartons per minute from level conveyor. It has two side squeeze belts adjustable for variety of sizes. 5. Continuous-chain conveyor for elevating and lowering oil drums. 6. Cartons leveling to incline belt at junction. Photos 3,5, Standard Conveyor Co.; 4,6, Lamson Corp.

effective methods of coördinating and synchronizing these conveyor lines is by means of pneumatic dispatch tubes with a central terminal in the planning department, manufacturing office or laboratory, and tube stations at various points where one operation blends into another.

These two integrated systems—or parts of a system—not only mesh smoothly and accurately in their own operation, but they provide an effective method for getting practicable standards of "unit-time" performance per man and per machine. They are an effective method for establishing a routine of preparation, operation, and control that will insure constant maintenance of the conditions under which work standards are set up. And they are effective for working out such mechanisms as routing, order-of-work, controlled conditioning and delivery of materials, tools, containers and the like.

A large wholesale drug company installed a combination gravity roller conveyor and belt conveyor to handle their merchandise, and a pneumatic tube system for dispatching papers throughout the plant. The roller and belt conveyor system increased the volume of this drug plant 50 per cent. The conveyors cost $7800 installed, and the pneumatic tubes $4200. Savings of $18,000 or $20,000 a year are traceable directly to this combination system. A recent addition to their present system, at a cost of $15,000, may save double that the first year.

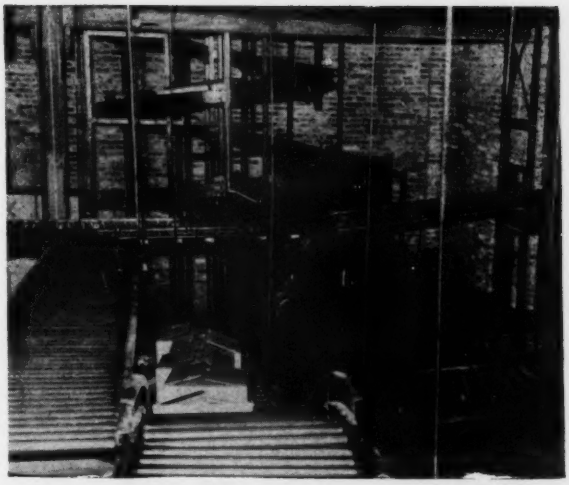
Naturally the dispatch-tube part of the system is the simplest. It varies only according to the size and shape of the carriers and tubes required to handle the various papers and records. The conveying systems are most complex. They must meet a much wider range of plant and process conditions, but thanks to modern conveyor engineering which has reduced virtually every handling problem into simple components that can be handled by combining standard types of conveyors, little, if any, special designing has to be done.

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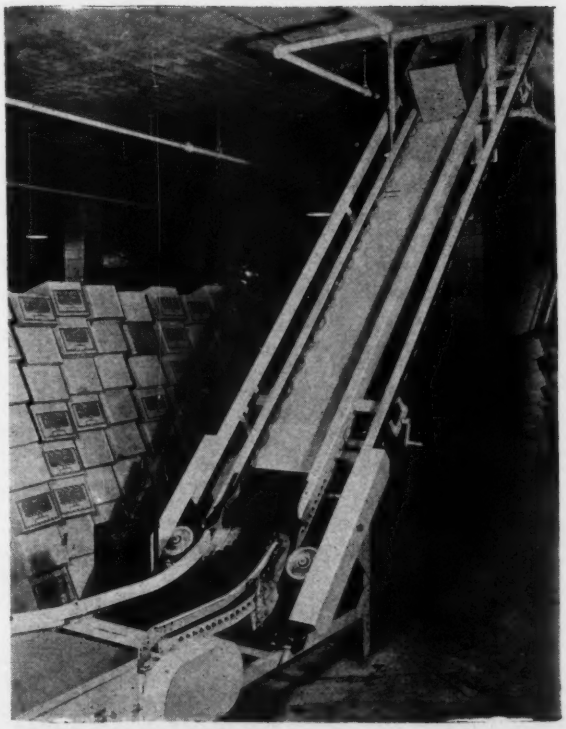


7. Gravity roller spiral-lowering cartons while gravity and power-roller conveyors deliver them to the packer. 8. A 45-deg. booster has driven rubber roller at bottom for automatic feeding of cartons into special squeeze belt. 9. Overhead chain conveyor carries cartons to and from storage, to loading. 10. Reversible-slat conveyor handles loads to packing and shipping departments. Photo 7, Standard Conveyor Co.; 8, 9, 10, Lamson Corp.

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Types of conveyors

The standard conveyors break down into eight classifications. They are as follows:

Gravity roller conveyors—Using only gravity as motive power, these conveyors consist of a series of free-turning rollers mounted in a rigid frame. The rolls are made in various sizes to accommodate various loads, and they are light enough so that even empty cardboard boxes overcome inertia of roll tube and roller bearings.

Gravity chutes—Made of structural steel and sheet metal, these chutes confine the load and reduce the speed of short travel from an upper to a lower level. Spiral chutes are used for longer drops and in places where space is limited. Some spirals have gravity roller sections, and some even are operated by power.

Live roll conveyors—Similar to the gravity roller conveyor, this type employs mechanical means to power the rolls. Power belts are snubbed against the under side of the rolls under tension supplied by snubbing rolls and sheaves located between the carrying rolls. Flat belts are used for straight travel, and round belts for curving travel. Chain types driving through sprockets on the rolls are also employed. Roller spirals, as mentioned above, can be powered with round-type belts, thus enabling continuous flow down declines of loads of varying weights, with no danger that fragile loads will be crushed between heavy loads. Loads also can be elevated in this manner without necessity of transfer from a horizontal to a vertical conveyor.

Belt conveyors—The belt conveyor is perhaps the best known type of power conveyor. Frequently, rollers are used for the intermediate sections between the end pulleys, but a more modern and usually more economical intermediate is the "slider" type. Ordinarily the bottom and side guards are formed of one piece of metal and

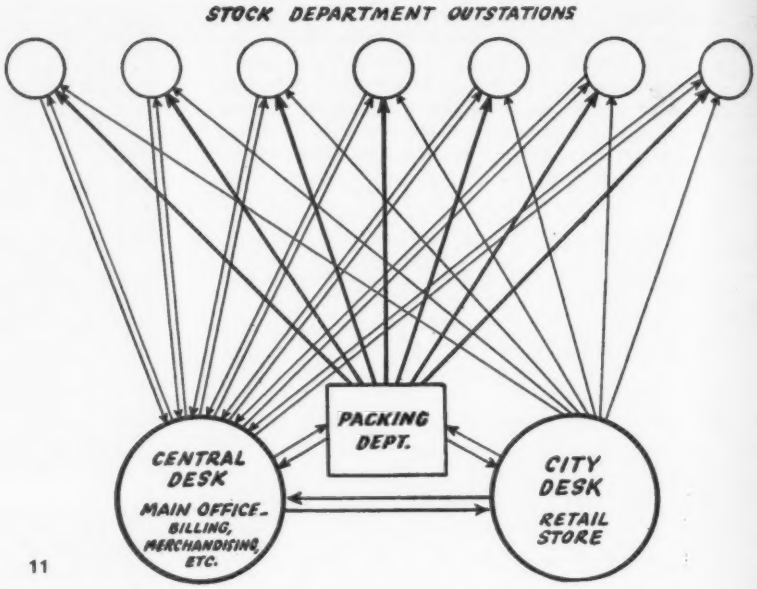
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11. A simple pneumatic-tube system facilitates exchange of correspondence, orders, stock requests, shipping notices, etc. Sketch Lamson Corp.



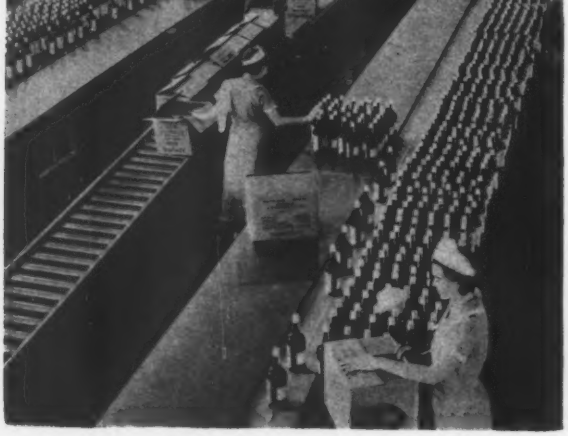
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the belting slides in this trough. The slider type of intermediate is confined to comparatively light loads weighing 50 lbs. per square foot or less, because of increased friction and wear when heavy loads are conveyed.

Booster conveyors—Belts are often installed to convey loads up or down inclines. Cleats may be fastened in the belting, the maximum angle of incline being governed by the stability of the loads. Cleats present a real problem, however, in transferring loads from conveyor to conveyor. To overcome this objection, belting with special non-skid surfaces is used. Angles of incline are then limited by the effect of the belting on the load.

12. Belt conveyors, steel work tables and gravity roller conveyor cartoning liquor. Photo Mathews Conveyor Co.

12



Chain-slat conveyors—This type of conveyor consists of two strands of chain with slats fastened to attachments on the links of chain. It is used in place of belt conveyors when either the weight or the character of the load would damage the belting.

Overhead chain conveyors—In this type of conveyor the chain is supported from trolleys which operate in or on overhead steel track. Means for attaching the load to the chain are provided and may be in the form of hooks or carriers. The conveyor dips when necessary to bring the load down to a working height for removal at an operation or for performance of an operation while the load is on the conveyor. In this way the floor between operations is kept clear of obstructions.

Vertical conveyors—There are several types of vertical conveyors. The reciprocating type consists of a car suspended by chain or cable over a sprocket or sheave with a counterweight suspended at the other end. The load is usually automatically conveyed to and from the car, while the travel of the car in the shaft is controlled by limit switches.

Continuous vertical chain conveyors consist of one or two strands of chain with cars suspended from the chain. The cars are finger type that comb through corresponding finger type loading and unloading stations to effect automatic loading and unloading. This type of conveyor permits continuous loading at one level and unloading at another level at much higher rates than are possible with the reciprocating type of vertical conveyor. Vertical chain conveyors can also be made to give fully intercommunicating service to several floors. With this type of conveyor, loads at any floor may be dispatched to any other floor.

Conveyor engineers have helped hundreds of manufacturers to make man-power and man-hours more productive by planned material handling, by saving time, using plant space effectively, releasing man-power.

Package-printing equipment

by William Barton Marsh

Package wraps and containers and labels have long been and are being today imprinted and decorated on every conceivable type of equipment from the simple, hand-fed job press to the intricate, web-fed, multi-color offset or gravure press. In short, the selection of equipment and method of reproduction to be used must depend upon the character of the job to be done.

Here are some of the basic factors which must be considered before a decision can be reached as to the type of printing equipment which will be most suitable:

What material is to be printed or decorated?—It makes a great difference whether reproduction is to be done on paper, cardboard, cellophane, metal, or some other of the innumerable substances used in the construction and wrapping of containers. No one printing unit has ever been constructed that will reproduce on all of these different surfaces with equal success.

What is the quantity to be produced?—Length of run of any given label, wrap, or container is highly important in selection of equipment. It is impractical to attempt to produce package wraps or containers in production units of a few hundreds or thousands on the same type of equipment that is used, for example, to turn out chewing gum wrappers for which production units run into the millions.

What quality of work is required?—The amount the manufacturer can afford to pay for his container may be any figure from a fraction of a cent to one preceded by a dollar mark. His choice of wrap or container, of elaborateness of design, of number of colors to be used in decoration, will depend upon this factor of cost as well as on the kind of merchandise he sells, the market he hopes to reach, the competition he has to face, and so forth. Certainly the packaging of a 5-cent bar of soap will differ in many respects from the packaging of some exotic perfume which sells at $50 an ounce. The printing equipment most suited to the job must be gauged partly by the quality of the work to be done.

What are the characteristics of the container?—It must be waterproof, dustproof and scuffproof on dealers' shelves, resistant to acid, heat, or cold—all these factors have a bearing on the type of basic material from which the container is made and consequently upon the type of surface to be decorated. They also have a profound influence upon the kinds of printing inks, over-print varnishes, etc., that may be used and the methods of applying them. Obviously this directly affects any decision as to printing equipment.

The three major printing processes

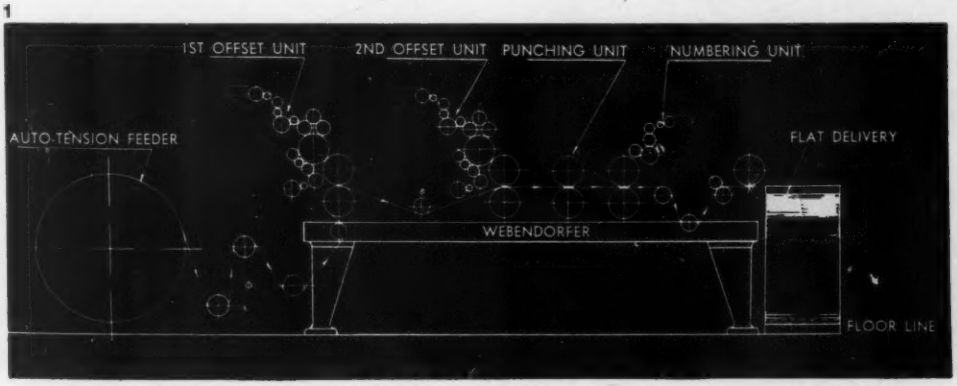
Since it is impossible to describe here all the different types of printing equipment that may be used for packaging, discussion will be limited to the major printing processes now in common use and to a few typical examples of the equipment commonly used in each of them.

There are only three major printing processes in common use today: (1) Letterpress or relief printing; (2) lithography or planographic printing; and (3) gravure or intaglio printing. The many variations listed under each of these main headings are mostly in superficial technique rather than the basic processes. Collotype reproduction, for example, differs considerably in technique from lithography, but both are basically planographic processes. All three of these major processes are regularly used in the imprinting and decoration of containers. A correct solution of package decorating problems, therefore, requires some understanding of all of these processes and of the outstanding characteristics of each.

*1. **Letterpress or relief printing***—The fundamental process of reproduction in graphic arts both because it was the first to be developed and because it is still the process most commonly used. In letterpress printing the image is reproduced by the application of ink to a raised or relief surface. The first medium used for relief printing was probably the woodcut, which was employed to reproduce pictures even before Gutenberg. Today letter-

1. Profile diagram, two-color, high-speed offset press. Webendorfer Division, American Type Founders, Inc.

1



press printing utilizes type or plates or any character cast or engraved in relief on metal, wood, rubber, linoleum, plastic material, or any other substance that will receive and hold the outline of the picture or character.

Letterpress printing has great flexibility, is particularly notable for its sharpness of outline and its ability to reproduce strong, clear color.

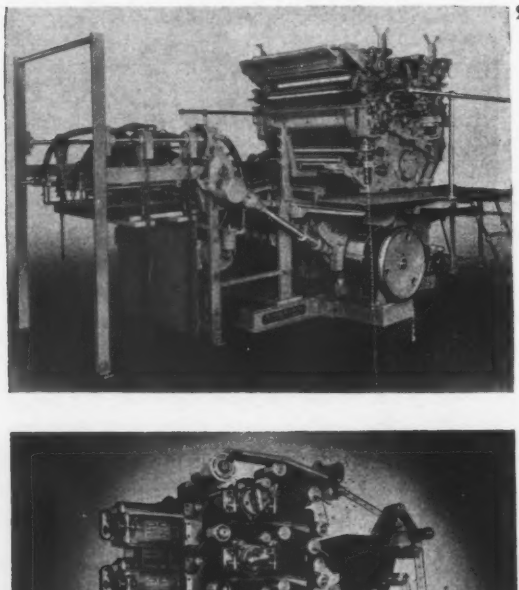
2. ***Lithography or planographic printing***—Called *planographic* printing because in this process the image to be reproduced is on a plane surface, not raised as in letterpress. The process is made possible by the natural, mutually repellent properties of oil and water. In the original process (now known as *direct* lithography) the image is drawn with a greasy medium on a piece of semi-porous stone which is then moistened with water. When ink is subsequently applied to the surface of the stone, it is repelled by the water and adheres only to the greasy outline of the image. This is reproduced by applying paper under pressure to the surface of the stone.

Today direct lithography has been to a very large degree superseded by *offset* lithography. The basic principle of the process is the same, but in offset the image to be reproduced is etched by means of light upon a thin metal sheet which has been previously sensitized by a coating of bichromate albumin. After proper treatment, the albumin is washed away except where the image rests. Thus the image itself will accept the ink, whereas the raw metal when dampened with water will repel it. The image is not reproduced by the direct application of the paper to the inked image. The ink is first transferred or "offset" on a rubber blanket from which it is in turn transferred to the paper.

Offset lithography is particularly notable for a softness of tonal values difficult to achieve with letterpress. Offset is likewise most valuable for reproduction upon surfaces (such as coarse-grained papers, cardboard, etc.) not suitable for precise letterpress reproduction.

3. ***Gravure or intaglio printing***—The direct opposite of letterpress. The image to be reproduced is cut into a thin sheet or cylinder of copper. The ink, which is applied as a very thin liquid, fills up the small interstices of the image—excess ink being removed by means of a "doctor" blade. The image is transferred to the paper by direct pressure, the paper sucking the ink from the recessed dots that form the image. Gradations of tone are obtained by varying the depth of the engraving.

2. Two-color rotary offset press for metal-can decoration. Photo R. Hoe & Co. 3. Four-color press prints 150 ft. of cellophane a minute. Photo Champlain Corp.



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Typical printing equipment

Some idea of the variety of printing equipment now being manufactured, may be obtained by referring to the *Printing Year Book and Almanac*. This reference book divides manufacturers of printing presses into nine different groups listed below. Obviously there is considerable duplication in this listing, many of the manufacturers being listed under several categories. It is also clear that there are many printing presses constructed for particular purposes which have little or no relation to packaging. The list of possible equipment which may be used for packaging is so long that only a few typical examples of the printing equipment more commonly used can be given here. These examples are:

TYPE OF PRESS MANUFACTURED	NUMBER MANUFACTURERS
For aniline and other fluid inks	13
For production of continuous forms: fan-fold, multiple billing, sales books, and snap-out	13
Hand-fed and automatic cylinder, die-cutting and creasing, embossing, and perfecting small hand presses	32
Sheet-fed, rotary gravure	24
Sheet- and web-fed offset, offset perfecting, metal decorating, combination offset and letterpress	17
Proof presses	11
Sheet- and web-fed rotary presses: flat-bed web and others	24
For stamping, die-stamping, and roll-leaf hot stamping	14
For specialties: cartons, milk-bottle caps, tags, tubes, and wrappers	51

Letterpress equipment

Most letterpress equipment, except that used for newspaper and magazine work, is sheet-fed. A great number of different types of presses come within this category, but for commercial job printing the most important are:

1. Hand-fed and automatic platen presses (Brandjen & Kluge, Inc., The Chandler and Price Co.);
2. Hand-fed and automatic cylinder presses (American Type Founders, Inc.; Miehle Printing Press and Manufacturing Co.; Miller Printing Machinery Co.);
3. Sheet-fed rotary presses (C. B. Cottrell and Sons Co., Goss Printing Press Co., Harris-Seybold-Potter Co.).

Important for packages and labels are the multi-color letterpress units (Champlain Corp., the C. B. Cottrell and Sons Co.; the New Era Manufacturing Co.; Webendorfer Division of American Type Founders, Inc.) which will reproduce two or more colors in one printing operation. Many of these units are fed from a roll rather than by sheet.

Offset equipment

A number of different companies manufacture sheet-fed offset presses and these in several sizes. Among those in common use for commercial work are the presses built by the Harris-Seybold-Potter Co., R. Hoe and Company, the Rutherford Machinery Co., and Webendorfer Division of American Type Founders, Inc. Sheet-fed offset presses are also manufactured for the highest type of multicolor offset work.

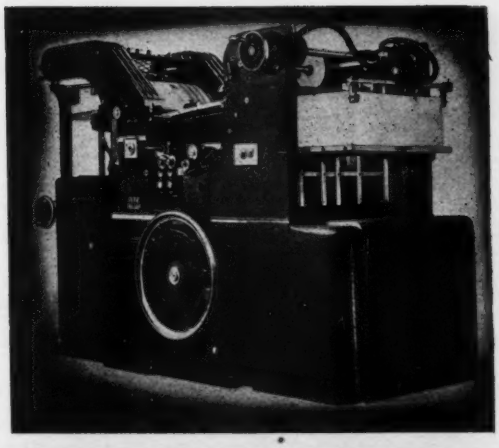
Web-fed offset presses which operate at a very high production speed are now being used with increasing frequency for both single and multicolor offset work. Much of this equipment is built specially by the manufacturer to meet customer specifications. Among those specializing in this type of equipment are R. Hoe and Company, the New Era Manufacturing Co., and the Webendorfer Division of American Type Founders, Inc.

Decoration on metal for containers is done almost entirely by the offset process. Special offset presses are required for this work because of the character of the material to be handled and of the process itself. Both single- and two-color metal offset presses are available, the more modern being equipped with automatic feeding devices. Manufacturers specializing in this type of equipment include the Apex Products Corp., the Bathrick and Palmer Machine Co., R. Hoe and Company, and the Rutherford Machinery Co.

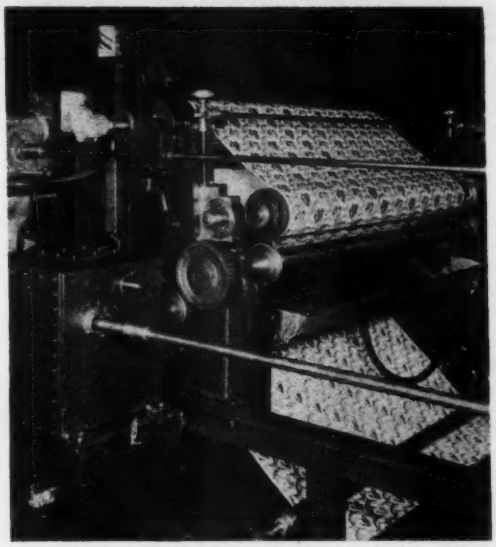
Gravure equipment

An important development for packaging is the sheet-fed gravure press which may be expected to take an increasingly active part in the production of commercial printing. Manufacturers of this type of equipment include the General Printing Machinery Co., the Harris-Seybold-Potter Co., the Hudson Sharp Machine Co., and the Rotogravure Engineering Co.

Web-fed gravure equipment is most commonly associated with the production of newspaper rotogravure supplements and picture magazines. However, gravure is finding steadily increasing opportunities in the packaging field because of the ability of these presses to use highly volatile inks and to apply lacquers and waxes. Many rotary gravure presses, such as those developed by the Champlain Corp., the Meisel Press Manufacturing Co., the C. B. Cottrell and Sons Co., and the John Waldron Co., have been specially built to meet the needs of the packaging industry.



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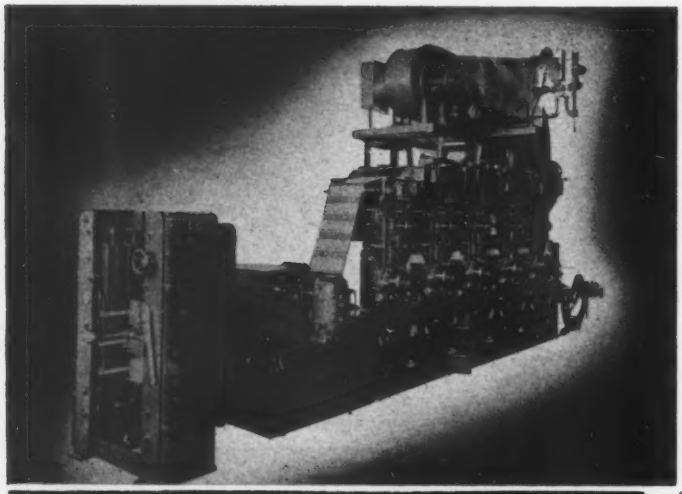


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4. Sheet-fed letterpress. Photo American Type Founders. 5. Multicolor gravure press, one to four colors; web runs 10–60 in. Photo Gravure Labs., Inc.

Trends in package production

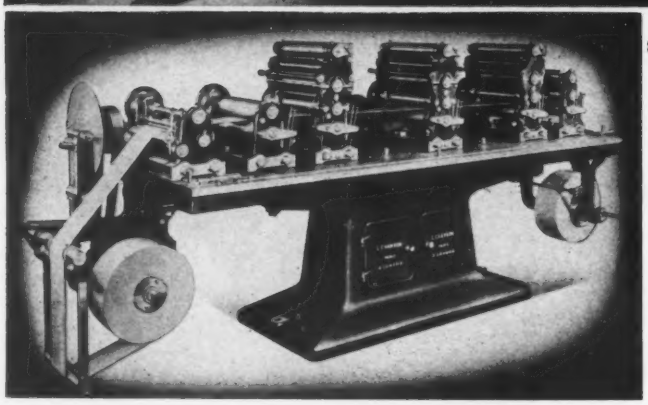
One of the outstanding trends in the imprinting and decoration of packages and in the production of package wraps and labels is undoubtedly that of steadily increasing speed of production. The number of products that are being distributed in large volume and over wide areas is constantly growing, and with this there is a corresponding growth in the size of production orders for containers and labels. To turn this work out quickly



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6. A five-color rotogravure press which delivers 54,000 wrappers or labels per hour. Photo Champlain Corp. 7. Machine for rubber-roller or rotogravure printing, aniline or pigmented coloring, gold and silver coating and relief topping of embossed stock. Photo A. E. Marconetti, Inc. 8. Web-fed multicolor letterpress which operates with continuous motion. Paper travels in a straight line and is re-rolled at the end of the operation. Photo L. Chambon Corp.

and economically, straight-line production has become not only desirable, but also often essential.

Another outstanding trend in packaging is the increasing use of multicolor designs. Competition, as well as the desire of manufacturers for individual identification of their merchandise, has done much to stimulate the demand for more and better color.

For both these reasons, there is a strong tendency for the big packaging jobs to be handled more and more on web-fed printing equipment, whether letterpress, offset, or gravure. The fundamental advantage of web equipment is that with the web of paper or other material under continuous control from feed to delivery, the material can be put through not merely one, but a whole series of manufacturing steps in one operation. Package wraps, for example, can be printed in 2, 3 or 4 colors, numbered, perforated, varnished—even specially imprinted with the distributor's name—then cut to size, and fed directly into the package wrapping equipment without interrupting the steady flow of production. A web-fed machine combines operations.

Since lithography and gravure adapt themselves more readily to a continuous web-fed operation than does letterpress, these processes are finding increasing use in the packaging field, particularly for long runs. Offset lithography has increased its usefulness by the development of the deep-etched offset plate which not only permits longer runs to be made from the same set of plates, but also improves the quality of the work done. Gravure printing has gained much favor because of its ability to deal easily with some of the recently developed fast-drying inks and lacquers.

Several of the many interesting phases of package decoration, such as the printing of cellophane and other plastics, the decoration of metal foil, the use of heat embossing and other such devices for the improvement of the appearance of the package or container, are discussed in other sections of this CATALOG.

Today many manufacturers who deal in volume production are finding it advantageous to set up their own printing departments to imprint or decorate their containers. In such cases, the equipment used is usually built especially to do a particular job. When a manufacturer is contemplating the setting up of his own production unit, he would do well to consult with a number of equipment manufacturers before deciding upon the equipment to be installed.

Any manufacturer who wishes to have his packages done for him by an independent printer can consult the employing printers' organization in his locality for the names of printers qualified to handle his work on the basis most satisfactory to him.

Coating, laminating & embossing equipment

F. W. Egan

IN addition to the printing of paper or board, there are three methods of converting them—by coating, laminating, and embossing—available to the manufacturer who wishes either to enhance the appearance or to increase the protective qualities of labels, wraps, inserts, covers, containers, and boxes.

Coating

Paper may be coated for either protection or decoration. Decorative coating is used on paper that is to be imprinted or that depends upon a high gloss to give it a special finish. The protective type of coating means a finish that protects the surface of the paper or protects the contents of a package where it is used as a wrapper.

There are various types of coating machines, such as brush, roll, knife, and spray. The choice of machine to use will be determined by the type of coating. Coatings that might show brush marks can be applied better by a roll knife coater. Those with a tendency to rib, i.e., coatings with a high surface tension, can be handled by a roll coater. A spraying machine can be used to advantage on rough surfaces, but it has a tendency to dry the coating material during the spraying operation.

The best printed effects are obtainable on clay coating because mineral substances present a fine surface for printing inks. Clay coating may be applied to paper with a brush and then brushed out. As this method is limited in speed, other means of applying clay coatings are used—direct and offset printing, air brush, spraying.

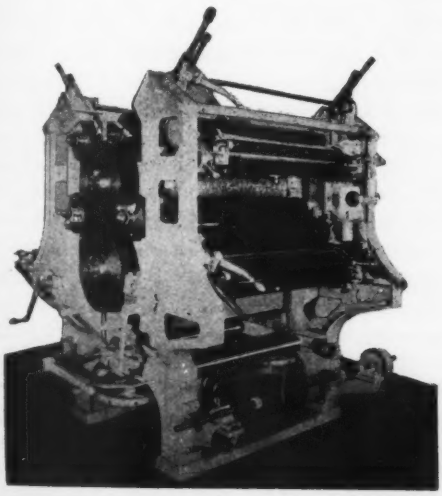
For the protection of food, coatings of lacquer and rubber derivatives are used and are most popular where packages are to be heat-sealed. The rapid advance made in the manufacture of these coatings has necessitated improvements in coating equipment. Varnishes are also used to coat papers for the protection of foodstuffs. They are applied by either the reverse-roll type of coating machine or a knife coater. The reverse-roll machine will successfully handle coatings with a solid content up to 50 per cent; whereas a knife coater can handle a solid content of 70 to 75 per cent.

Laminating

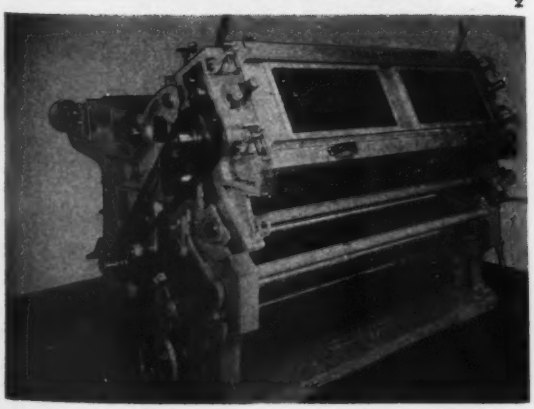
Laminating was formerly done on a paper machine, and the product was known as *mill-lined*. The combined web was passed around steam dryers and the best effects now obtainable from the laminating operation were frequently lost. It is now possible to combine without dryers, which permits flexing the board and lessening the rigidity that is often required in a combined web. When paper is laminated to paper or to board, the combined web should go directly from the laminator to the cutter in order to reduce mechanical curl to a minimum. If the combined web passes around any dryers, or is rolled, the sheets will always have some mechanical curl.

To reduce wet curl, adhesives high in solids are used, in

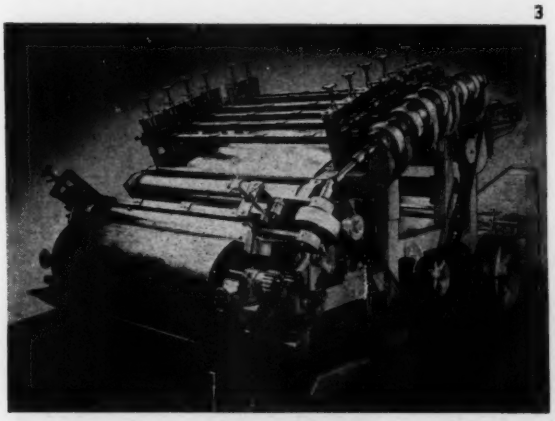
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1. A print-type embossing machine with four printing units. 2. Reverse-roll coater applys lacquer and varnish coatings for protection of foodstuffs. 3. Seven-brush arch bed coating machine for applying clay coatings. Photos John Waldron Corp.

straight-face, ground, large-diameter paste rollers which will apply a skin of adhesive having a high tack. The bond may thus be made in a single nip, and holds because no further pressure is applied. When additional nips are necessary, the large-diameter rollers in the laminator produce a semi-calendering effect.

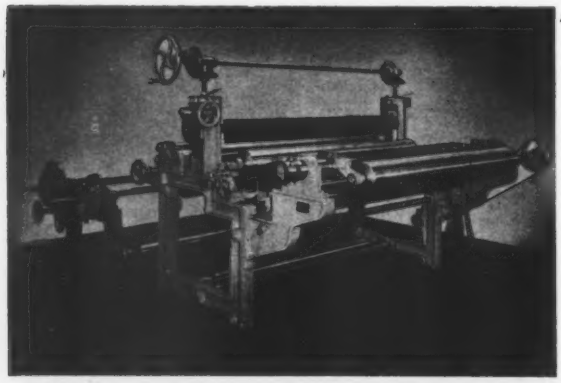
Chilled iron rollers are now used instead of steel or rubber-covered rollers. They produce a combined web with a finished surface that will take printing readily, and reproduce the fine lines of rotogravure printing.

For the laminating of three to five webs, a high-speed laminating machine may be used. Such machines, which can be run up to 600 ft. a minute, are being built in widths up to 100 in. or more. Electrically operated quick-lift rigs are used for lifting the top laminating roller, and the backing rollers and doctor units in the paste sections. The paste sections can handle wax, starch, silicate or asphalt adhesives. For the application of special adhesives, such as wax-carrying rubber derivatives, a hot-melt laminating machine may be used.

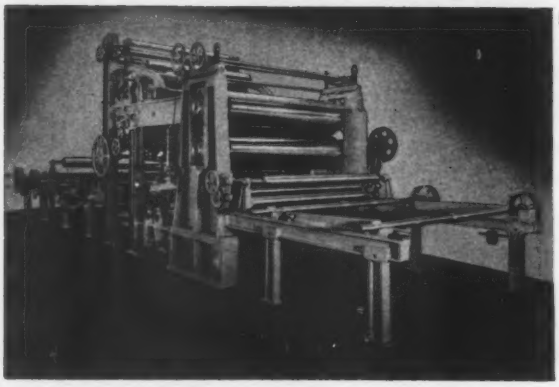
If only two webs are to be combined, a small two-ply laminating unit will turn out an excellent product. This type of machine, which is of simple construction with all parts accessible, is much used for applying varnished papers to pulp board and cork. These sheets are used as lining for caps on glass containers of preserved foods.

Laminating machines are producing sheets in which several webs of chip are combined, and finished off with liners of news litho, glassine, or acetate webs. They are also being used for the combining of metal foil or cellulose fibre to paper and board.

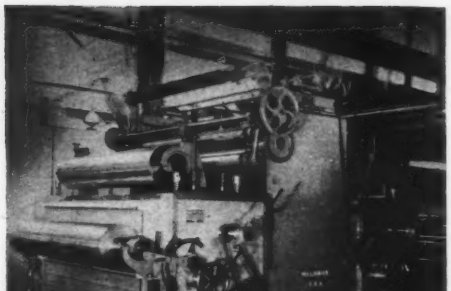
4. High-speed machine for laminating three, four or five plies at a speed of 600 ft. per minute. 5. Specially designed knife coater for applying high-solid lacquer coatings. Photos John Waldron Corp.



4



5



6

6. Hot-melt laminating machine for the application of such adhesives as wax-carrying rubber derivatives. Photo John Waldron Corp.

Embossing

Paper or board may be made more attractive by embossing, which adds depth and tone to a printed surface. This treatment tends to soften paper and is occasionally used to break paper that tends to curl from any cause. It is not recommended where strength is required.

For the embossing of paper or board, a hydraulic machine offers many advantages. Since the rollers are mounted in sub-frames, they can be quickly removed. An operator can use one frame with several sets of rolls.

Most designs can be embossed without difficulty. Some designs offer a problem because the varying depth of the engraving makes the winding operation difficult. Hydraulic embossing units produce a uniform pressure across the face of the roller and turn out a uniformly embossed web. An interesting combination is *print embossing* in which the ink is laid on the embossing pattern of the engraved roll and transferred to the surface of the paper as the embossing is pressed into it.

Inking attachments can be mounted on the embossing machine. The ink is either laid in the low spots of the embossing, kissed on the high spots (for shadow effects), or applied in varying combinations of the two. Ink-embossed effects in multi-colors are used to advantage on stocks for labels, catalogs, or covers.

Another method of embossing is obtained by running an engraved roller in contact with a paper roller without gears. The paper roller is moved from side to side in the machine to iron the surface of it. Thus a flat-back embossed effect is obtained. The paper stock is embossed only slightly, but it is attractive for art work, stationery, greeting cards and favors. Boring the steel-engraved roll helps to bring out good effects in sharp relief.

Maintenance problems

by John B. Tuttle

Change has been the order of war. New items have had to be packaged rapidly and well. Old package types have been adapted to the material limitations war imposed. Frequently, costly equipment had to be set aside—stored wherever it could be placed out of the way—to await return to peacetime production.

With the cessation of war, change will be again the order. The important difference between reconversion and conversion to war use is that it can be planned, that time will permit careful study.

Vital part of such plans should be an appreciation of the factors which contribute to the deterioration of packaging machinery both when idle and when in use. Unless adequate protection has been afforded it, intricate modern machinery may suffer more idle than operating.

In use, packaging machinery is subjected to wear due to the friction of its moving parts, one on another. Correct, adequate lubrication reduces this to a minimum. Simultaneously it may be subjected to corrosion and rust either by the atmosphere in which it is operated or by the material being processed. When idle or in storage, friction is absent, only corrosion must be avoided.

Necessity and experience have developed means of effectively combating and minimizing these effects. Selection and use of these aids require only an understanding of what is to be done and the means available for its accomplishment.

Almost infinite variation in materials of construction, speed, loads and plant environment make generalizations difficult in suggesting maintenance methods. What follows must therefore of necessity be considered only a general outline of principles.

Prevention of corrosion and rust

Ever since man has had metals he has had to combat corrosion and rust. The surface of brass and copper dulls quickly, and steel or iron left in the open for only a short time is covered with a deposit of rust or iron oxide. Oxygen and moisture in the atmosphere aid the metal in its attempt to return to the form in which it occurred in nature. If the piece has been machined or polished for a given purpose, this action usually unfits it for use. The film of oxide must be removed, requiring both effort and frequently change in dimension.

Slow as this action may be naturally, many external agents promote it: sulfur, acids, alkalis, gases such as hydrogen sulfide and oxygen, and atmospheres containing corrosive salts are some of these. Electric current may also assist in accelerating metal corrosion. One or more of these may be present wherever packaging machinery is operated, and will exert some effect.

Modern practice has developed three principal methods of combating corrosion listed below.

Use of special metals resistant to corrosive action has general acceptance in packaging machinery construction and requires no extensive discussion. Drugs, pharmaceuticals, foods and cosmetics are packaged in units which have storage tanks, feed lines, filling spouts and conveyors protected from corrosion by fabrication from non-corrosive materials. Selection is usually the result of consultation and test by both the purchaser and the fabricator, and must be a part of the plans for any new machine. The suppliers of the metals or the alloys test them to define their fields of utility and can usually promptly state their usefulness with certainty. While still quite expensive, especially in large installations, non-corrosive metals will play an increasingly important role in future.

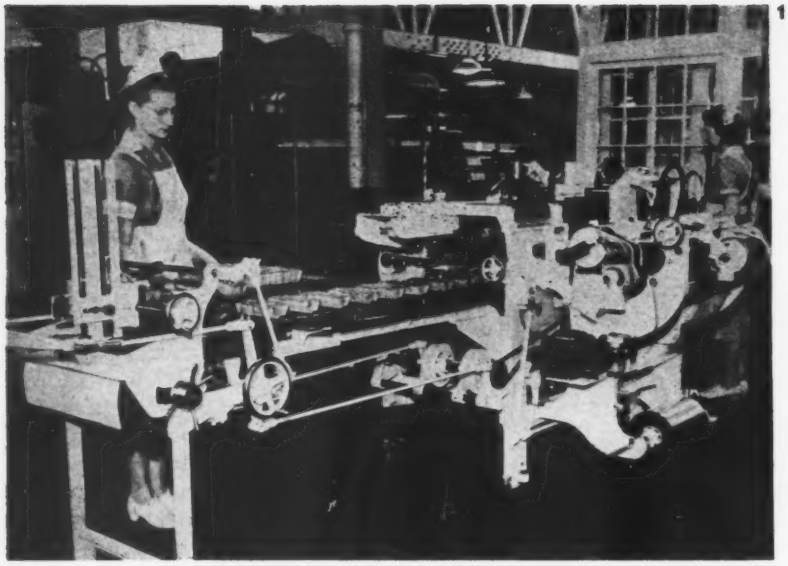
Plant environment—The attention given to plant environment in protecting product quality in modern packaging has also aided in preventing equipment corrosion. Packaging is usually apart from the fume-laden atmosphere which so often accompanies processing, and its equipment benefits accordingly. However, the product itself usually reaches some parts of the filling unit, and its tendency to promote corrosion during idle periods and week-end shutdowns is an ever-present menace. A regular plan of equipment cleaning goes a long way to correct this. It must be systematic, thorough and done with the frequency which experience dictates.

Protective coatings—As indicated, corrosion is primarily a surface action. Thus protective coatings offer the easiest—and usually the least expensive and most effective—method of safeguarding costly packaging equipment. This is especially true of stand-by or stored units which may have to be restored to operation in the shortest possible time. Modern mechanized war compelled us to study these methods critically as it demanded that intricate machines and spare parts be transported long distances and arrive ready for almost instant use. Reconversion will be able to use the same techniques.

Protective coatings are of two types, the permanent which resists abrasion and can be removed only with difficulty, and the temporary or "slushing" type which can be removed with a suitable solvent and some rubbing. Permanent coatings include plating with a non-corrosive metal or material, paint, lacquer and similar hard-drying composition.

The plating of parts is well established as a packaging machinery practice and needs no extensive discussion. Choice of the plating material must involve many of the same considerations as the use of the alloyed metals. Thickness of the coating required must be based on the service-life expected and the influences tending to its removal. Careful review of these factors frequently permits a low-cost base material to be plated.

While paint is frequently regarded only as decorative, its primary function is to protect. Here the package machinery operator has his greatest opportunity to insure



1. On automatic wrapping machinery which handles food products, special non-injurious lubricants must be used to avoid any possible hurt to the consumer. Photo Battle Creek Bread Wrapping Machine Co.

his equipment against serious corrosion. Somewhere a paint has been developed for almost every known corrosive condition. It is then but a matter of study to select the one best suited to a given set of conditions. A simple review with a paint technician of the surface to be protected, the corrosive influences present and their concentrations, and the durability desired, is usually adequate.

New machinery is usually painted by the fabricator. If the purchaser can so dictate, a quality protective coating should be selected as a part of the design. If not, he should try to learn the nature of the coating used. If it is not suited to his plant conditions, it should be renewed with a more suitable type.

Paint protects only so long as the surface remains unbroken and of adequate thickness. It is subject to the action of certain solvents, abrasion, and heat or cold. Thus, once painted, machine surfaces cannot be forgotten indefinitely. They must be regularly inspected and renewed when wear or chipping and flaking has exposed the metal.

Machined moving parts can seldom be painted. While in operation, they are usually protected from corrosion by the lubricant used to reduce mechanical friction. There remains only the problem of protecting them during storage as spare parts or when the machine is idle. For such use, the petroleum industry has developed several types of non-drying rust preventives which provide excellent protection, may be easily removed.

In consistency, these protective compounds range from free-flowing liquids suitable for spraying to heavy greases which must be heated for application, but which usually give superior protection. They usually consist of a refined petroleum base to which have been added certain ingredients which enhance its ability to prevent corrosion and to neutralize finger stains, etc., unavoidable from handling during fabrication and inspection. Most oil companies publish bulletins explaining the utility of their various grades of rust preventives and providing explicit directions for their application and removal. Also they usually have staff engineers experienced in corrosion prevention.

Preparing packaging units for storage or re-use

If a packaging unit is to remain idle for a time, its storage preparation must be an ordered procedure. Time spent in cleaning and protecting it is amply repaid.

Cleaning—First, it must be thoroughly cleaned. This is preferably done in some location with more freedom of access than when the machine makes up a part of a production line. Paste reservoirs and similar parts should be completely emptied and cleansed with a suitable solvent or detergent. Rubber-covered rollers, guides and other parts should be removed when possible, cleaned with an appropriate cleaner, and stored under conditions limiting deterioration of their coverings. All metal surfaces should then be cleaned of oil and grease.

A solvent* has been developed which is entirely adequate for general machinery cleaning. It has a minimum flash point of 100 deg. F. and has an underwriter's rating of 30–40 with kerosene. It is an effective solvent for oils and greases and, while inflammable, may be used safely if ordinary precautions are observed. It is usually best applied by brushing, the operation being repeated until the surface is free of soil. Spraying may be necessary with intricate mechanisms where force is required to dislodge accumulated, hard-to-reach dirt and grease. It should be done only with adequate ventilation and with acceptable spraying equipment.

Use of corrosion preventives—Following cleaning, the unit should be inspected critically to determine what corrosion preventives should be applied and to what parts. There is usually more time available for painting when the unit is taken out of service than when it is to be placed in service. Also, the surfaces are clean and free from dust which inevitably accumulates during storage.

* Stoddard Solvent.

Painting done, wearing surfaces and machined parts should be coated with a non-drying rust preventive. Choice of the grade will depend on the storage conditions anticipated and the length of the inactive period. Application by brush or swab is preferred since this applies an adequate coating only to the parts requiring protection, minimizing cost and reconversion cleaning. If the coating requires heating, an electric glue pot or some such container permits freedom of movement and constant application temperature.

By nature, the film of a non-drying corrosion preventive is easily subject to abrasion or wiping as it does not harden after application. Thus parts covered with it must have some added protection to insure against such disturbance. This is easily done by wrapping the parts over their general contour with industrial kraft paper. This covering should be firmly attached by ties or wires, and need cover only protruding parts which would be bumped or touched during the stand-by period. With this preparation completed, the unit is ready for storage, preferably in a dry location where it will be subject to a minimum of corrosive atmosphere and temperature change.

Such a preparation method for storage makes re-use of the unit quite simple. The paper wrappings are removed after the unit has been moved to a location of ready access; machined surfaces are freed of their protective coating by rubbing or brushing with a solvent which is also effective in removing accumulated dust from painted surfaces; adjustment of removed rollers, guides, etc., is easily accomplished; and moving parts oiled or greased.

Lubrication of packaging machinery

In motion, the machine elements of a packaging unit present literally hundreds of metal-to-metal contacts. These must be separated with a lubricant to minimize wear and insure accurate performance. Modern petroleum technology has developed products for these applications.

In its simplest terms, the lubrication of packaging machinery is the same as that of other high-speed, complex mechanisms. The correct lubricant must be selected and properly applied at regular intervals. The second part of the problem is largely up to the machine operator, once the selection is made. While many operators are also able to make the selection, it is generally recommended that a lubrication engineer be consulted.

The correct lubricant for the machine is chosen after consideration of all the factors which affect its performance. To the unitiated, these may seem fewer in number than is really the case. For example, in lubricating a given group of packaging machines an engineer may have to consider any or all of the following: the machine element involved (gears, bearings, cams, slides, etc.); the temperature of the moving parts; the load and load variation; the speed and speed variation; operating clearances; whether parts are open or enclosed; atmospheric conditions; importance of leakage; contaminants such as the material being packaged or glue, etc.; and the method which can be used to apply the lubricant. In food-handling equipment there may also be Federal or local regulations covering the quality of the lubricant used. All these factors must be weighed as to relative importance, and the lubricant chosen which, when properly used, will most nearly satisfy all of them.

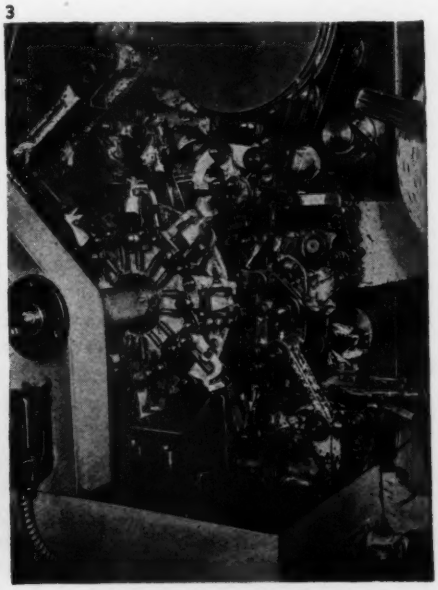
A lubricant usually performs two functions: it prevents contact of metal surfaces, substituting low internal friction of the lubricant itself for the high friction of the metal; it also serves as a means of dissipating frictional heat by conduction. These two functions dictate in a general way the nature of the lubricant and its physical character. High-speed spindles are best lubricated with a light-bodied oil—the higher the speed, the lighter the oil used. Light-bodied oils have low internal friction and are good heat conductors. Also they flow freely at all temperatures, insuring a constant lubricating film.

Slow-moving elements may require viscous or semi-

2



3



2 and 3. Some packaging machines, unbelievably complicated, present a bewildering array of lubrication points. Illustrations show a tea-bag machine (close-up at right) which, by actual count, has 85 lubrication fittings for light oil in addition to 30 fittings for grease. Photo Standard Brands Inc.

solid lubricants. Their slow speed causes less frictional heat, and maintenance of a lubricating film is of greater importance. The greater density of the heavier oils enables them to cling to the element surface, preventing damage to metal contact. Also, their cohesive nature limits the amount of the lubricant which will be thrown off, reducing the frequency of application.

Types of lubricants—Petroleum lubricants for packaging machinery are of two general types—oils and greases. Oils vary in viscosity or body density from light spindle oils to heavy cylinder oils used, for example, in enclosed gear drives. Greases are oils of different viscosities which have been rendered solid or semi-solid through the addition of soap or other thickening agents.

The soaps used are usually calcium, sodium or aluminum—each imparting certain special characteristics to the grease prepared with them. Calcium or lime soap greases resist water but are somewhat less stable under high-speed operating conditions than soda soap greases. For this reason, calcium soap greases are usually chosen for bottle-filling or canning machinery where water inevitably reaches the bearing surfaces. Likewise, soda soap greases are usually recommended for high-speed anti-friction bearings or bearings subjected to high operating temperatures caused by radiant heat.

Aluminum soap greases have less water resistance than calcium-base products, but possess high cohesive power. They are usually applied to parts subjected to intermittent or throwing motion where they must adhere firmly to the metal surface. All these grease types are available in different consistencies, and correct selection involves considering both the composition and the physical form.

Lubricating bearings—Most packaging machine bearings are of two types—anti-friction or plain journal bearings. The anti-friction bearings are of the ball or roller type and most frequently are grease-lubricated. They usually operate at fairly high speed, and should require lubrication at infrequent intervals if the grease has been correctly chosen and is not washed from the bearing by water or other contaminants. Most anti-friction bearing manufacturers prefer the soda-type lubricant since it exhibits better stability in service. However, soda-base greases cannot be used in moist or wet conditions, and calcium or aluminum greases must be applied.

The grease is usually applied to the anti-friction bearing with a grease gun of appropriate size which is filled directly from the shipping container of grease. Caution in using the gun should avoid excessive use of grease. Many precision bearings may be harmed as much by excess grease as by too little. If the grease is packed into the bearing under pressure, the friction between the rotating element and the grease may cause overheating and seizure. Many bearings are designed with vents to prevent this, but if they are not evident care should be taken to avoid overlubrication.

Many plain bearings on packaging machines are also lubricated with grease. These include journal bearings which are not easily accessible, bearings which require infrequent lubrication due to slow speed or low load, and elements such as cams, slides, etc., on which a film of oil cannot be maintained easily. The grease is usually applied either by a grease gun or through a screw-down cup. Gun application usually involves applying enough grease to force some out of the ends of the bearings. This tends to flush out any contaminating abrasive present and insures a complete grease film within bearing. Screw-down cups are filled at regular intervals by removing the cap and filling the recess level full with grease. Bearing lubrication is accomplished by turning the cup down a few turns at each lubricating interval until the grease has been used. Spring-loaded cups are available.

Oils are usually applied to plain bearings by hand can, drip oiler, wick or mechanical-feed system. The drip oiler has a reservoir which feeds oil slowly by gravity while the bearing operates. Wick feed depends on the capillary climb of the oil to replace that wiped from the wick surface in contact with the moving element. Mechanical systems are synchronized with the machine motion and deliver a measured amount of oil at regular intervals. Satisfactory operation of any of these requires systematic examination to determine their condition and, of course, the selection of both oiler and lubricant fitted for a given machine element.

The correct lubricant for the product—Spattering and dripping of the lubricant is a disadvantage on almost all packaging units. The oil may reach the contents of the package, spoiling it; it may damage the appearance of the container and cause excessive lubricant expense. Aware of this, the petroleum technologist has developed the so-called semi-fluid or clinging type oil lubricant. These products are semi-fluid in consistency and contain added elements to improve both their cohesive and adhesive properties. These are of special interest for use on cams and other intermittent motion units which tend to fling the lubricant from their surfaces. They are usually light in color, and they can solve many difficult lubricating problems.

In packaging foodstuffs and such items as cigars, cigarettes and pharmaceuticals, it is usually desirable to use a lubricant which is not deleterious to human health should it inadvertently reach the packaged material. The petroleum industry meets this need with both oils and grease-like materials—U.S.P. in quality.

Storage of lubricants—Having selected the proper lubricant and arranged its systematic correct application, there remains the problem of storage. The petroleum manufacturer realizes that modern light-speed units are frequently machined with a precision formerly accorded only to fine measuring instruments. Maintenance of these surfaces is vital to their operation, and they may be easily spoiled by only slight contamination of the lubricant. He therefore cleans shipping containers with care, and repeatedly filters each lubricant as it is packed. All this is valueless in terms of machine protection if the machine operator does not observe equal care in storing and using the material.

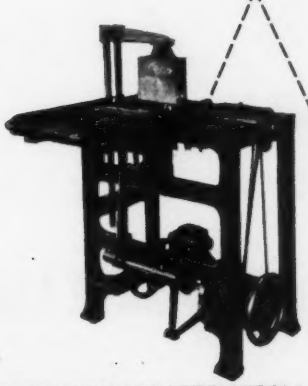
Barrels and cans should be stored so that they are easily accessible but as free as possible from contamination. System in lubrication is difficult only until one has become accustomed to it.

XUM

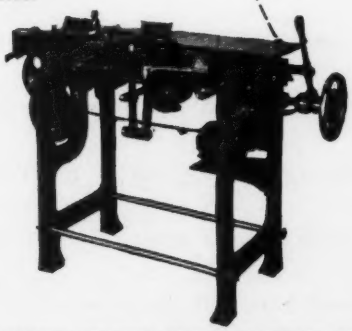


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PETERS JUNIOR CARTON FORMING AND LINING MACHINE.
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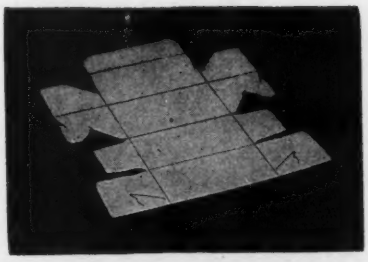
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THESE machines have shown their ability to meet the production demands during these critical times only because of their precision engineering and design. Many different types of food products are packaged daily with this equipment which "stands up" under the most difficult production programs.

While we are now manufacturing parts for planes, tanks and submarines we are also making plans for the future when priorities will be removed and once again equipment can be purchased for peacetime production. New methods and materials developed will be incorporated in these machines for even better performance.

With high priorities a few of these machines can now be built without interfering with our other war work. When priorities are not obtainable, we are accepting orders for Post-War production and listing them as received in which sequence shipments will be made. According to all indications, there will be a great demand for equipment when Peace comes and many companies are working out their problems now to assure delivery of machines as soon as possible after this time.

If you have a packaging problem, send samples of your cartons and ask us to recommend equipment to handle them. Your inquiries will have prompt and careful attention.



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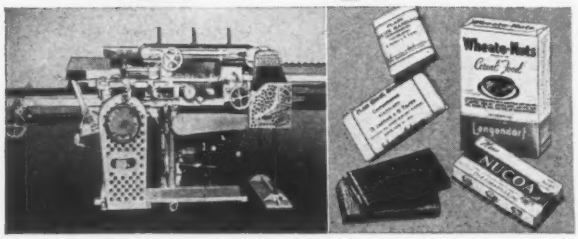
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PACKAGE MACHINERY COMPANY

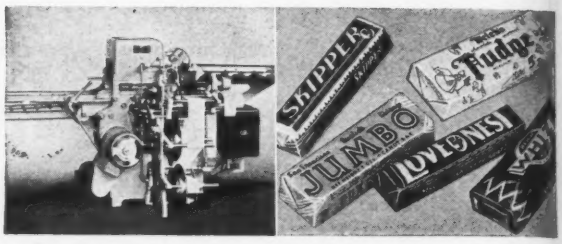
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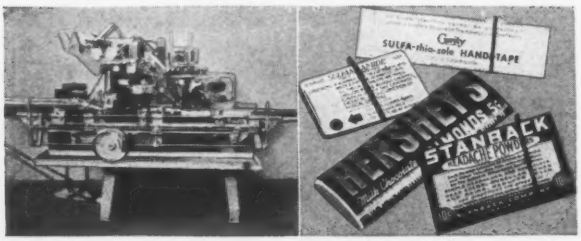
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Model FA—An extremely versatile machine, quickly adjustable for a wide range of sizes. Handles open boats and flat objects as well as cartons. Uses any type of wrapping material.



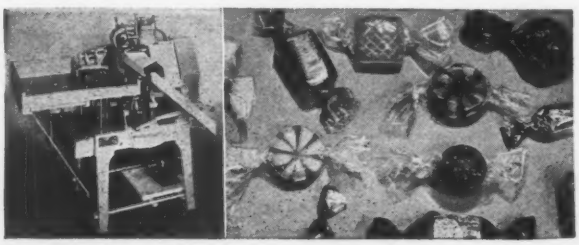
Model DF—Built especially for wrapping irregular shaped bars, this machine produces a uniformly sized, perfectly formed wrap, irrespective of product shape. Electric Eye locates the printed design accurately on the bar. Quickly adjustable.



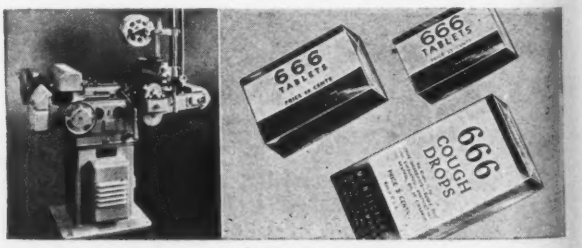
Model CA-2—The CA machines have proved adaptable to many different types of products—chocolate bars, tape bandages, headache powders, sulfanilamide for first aid, etc. Inserts an easy-opening tape in the wrapper, if desired. Quickly adjustable.



Model S-2—Used by leading soap makers. Handles many styles of wrapping. Adjustable for different sizes. Inserts cardboard or circular, if desired. Speeds up to 200 per minute. This machine has also been adapted to other products.



Model 22-B—Wraps candy in individual pieces. Handles hard or soft-center pieces in many sizes, odd and fancy shapes. Does combination type wrapping (for example, inner wrapper of foil, outer wrapper of transparent cellulose).



Model CM-2—Wraps small packages at extremely high speed—up to 450 per minute. Inserts easy-opening tape, if desired. Easily adjustable for various sizes.



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They're good machines—fast, economical in use of wrapping material, and extremely dependable. That's one reason why our wrapping machines are the most wjdely used. Another reason is *that they meet such a great variety of requirements.*

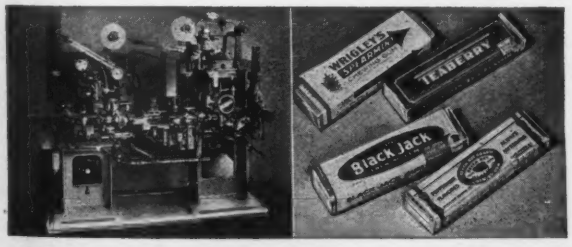
Available in a large number of models—and most models are quickly adjustable for various size packages, are easily adaptable to many types of products, and to all kinds of wrapping materials. This broad scope has proved of inestimable value to manufacturers who have had to switch from peace-time production to war products requiring special forms of wrapping.

We are always glad to cooperate with those planning package improvements. In fact, many of the outstanding packaging innovations widely used today were made possible by our machines.

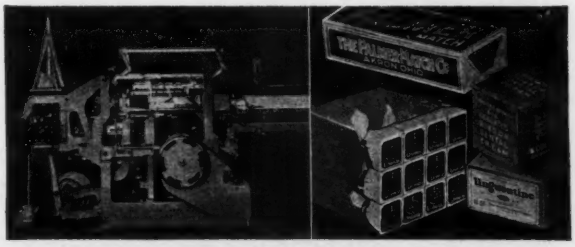
When planning a new package for your product, or when seeking the best type of package for a new product, consult us in advance. It will insure your obtaining not only a package with strong selling features, but one that can be most economically produced by machine.

Consult the Package Machinery Company office nearest you





Model AC—Makes the standard chewing-gum package, performing all operations. Wraps and bands each stick individually, assembles five sticks, then bands package with printed label and applies cellulose wrap with easy-opening tape. Speed, 600 sticks per minute.



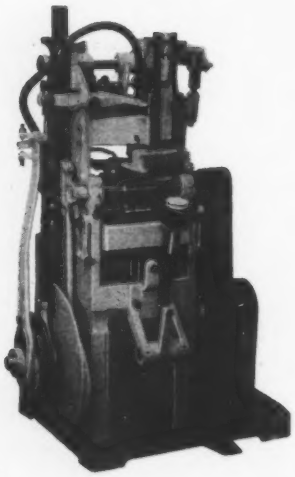
Model F Bundler—An adjustable machine for bundling packages in various quantities. Registers printed panels accurately. Attaches end seals. Machine bundling makes striking savings in both labor and material costs.

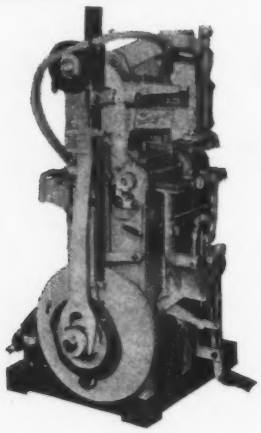
XUM

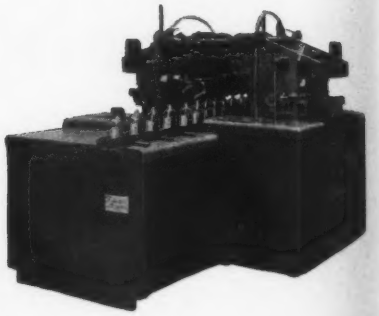
NJM CORP.

Get **FACTS** — and you'll get **LABELRITES** to assure Post-war economies and do a really perfect job!

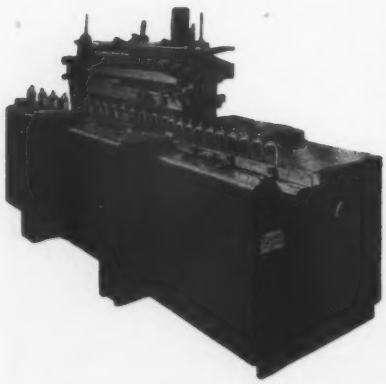








"ONE-AT-A-TIME—TWO-AT-A-TIME—OR HIGH-SPEED FULLY AUTOMATIC"



You'll WANT lower production costs when Victory gives the "go-ahead" to Post-war production . . . and you WILL get *better* labeling, when you make sure of these Labelrite features.

- **PERFECT REGISTRY OF LABELS**
- **NO "WIPING" OF CONTAINERS**
- **PETTY-CASH CHANGE-PARTS**
- **50 TO 240 LABELS PER MINUTE**

Wide size-range of label or package size, with simple interchangeable parts.

MOTOAIR
VACUUM-PRESSURE PUMP

With motor and pump in ONE compact unit; no gears, no drives, Motoair is ideal as an accessory, or as a portable cleaner-blower.

Catalog on Request



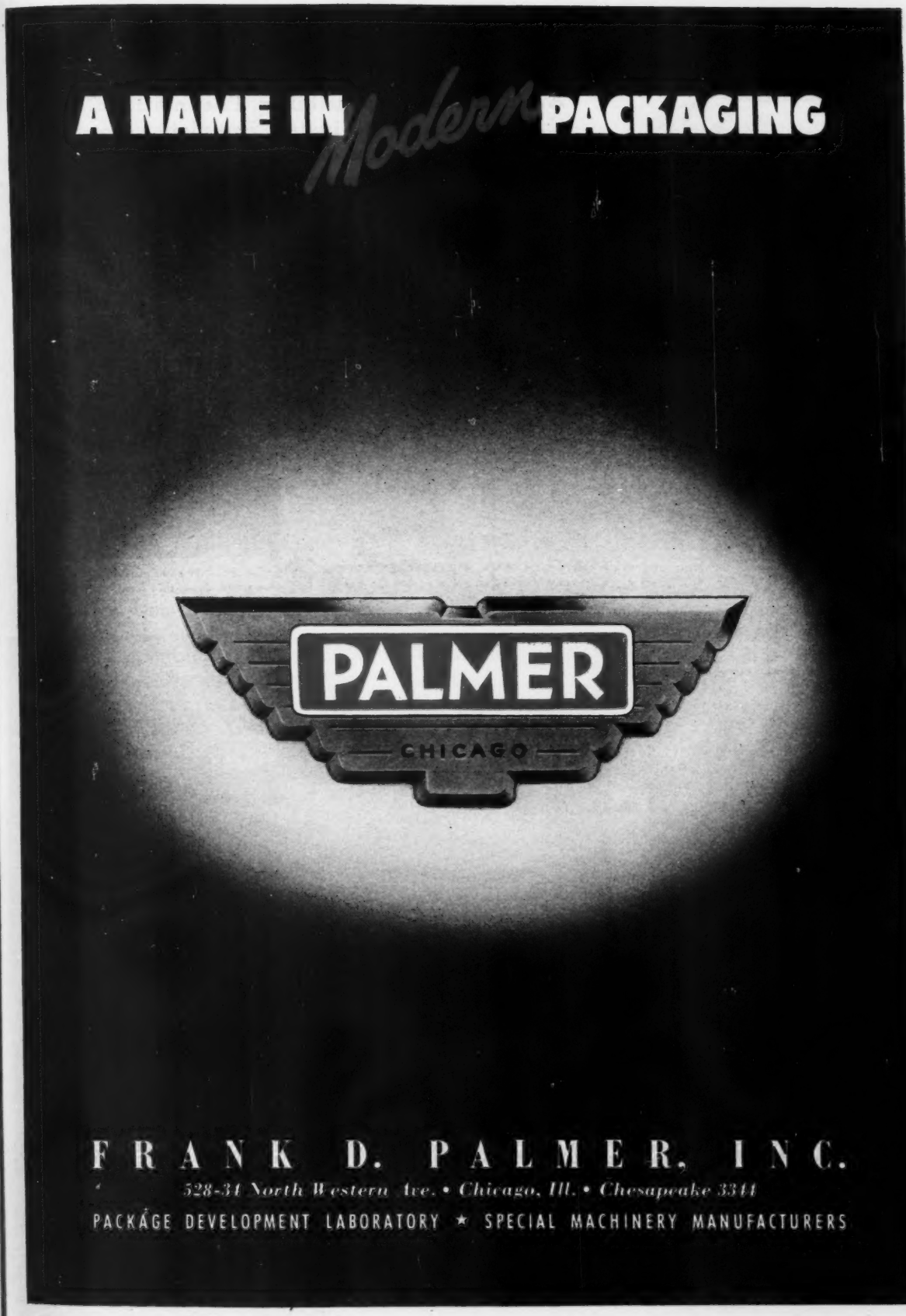
Complete details in Catalog. SEND FOR IT.

NEW JERSEY MACHINE CORPORATION

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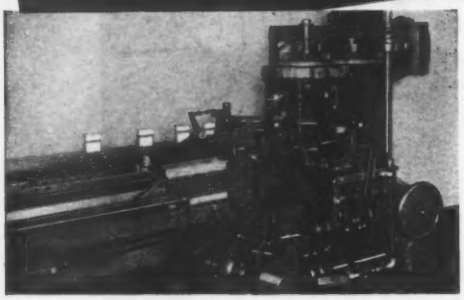

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PACKAGE DEVELOPMENT LABORATORY ★ SPECIAL MACHINERY MANUFACTURERS

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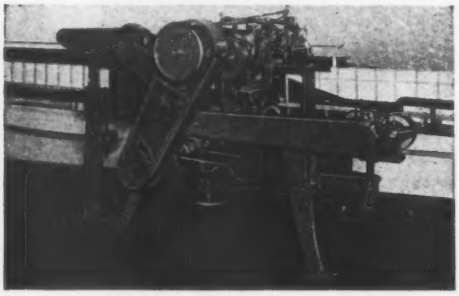
PNEUMATIC

"Start to Finish"
PACKAGING MACHINERY

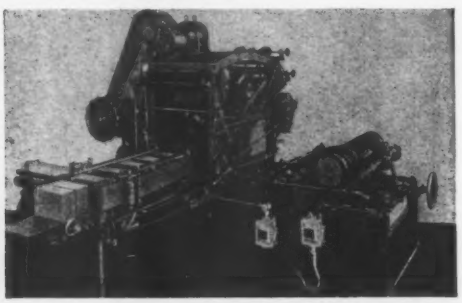
Avoid divided responsibility. Pneumatic offers you the opportunity to install complete co-ordinated packaging hook-ups designed, engineered, built and serviced by one company.



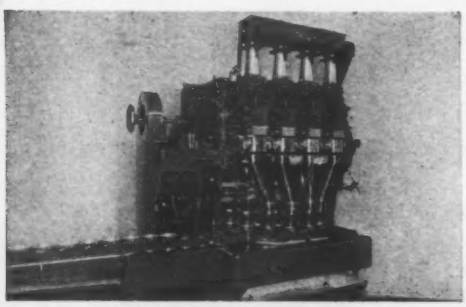
HI-SPEED CARTON FEEDER & BOTTOM SEALER—one of nine different models for feeding, forming and bottom sealing or tucking cartons at speeds ranging from 10 to 105 per minute. All models adjustable for different carton sizes within certain limits.



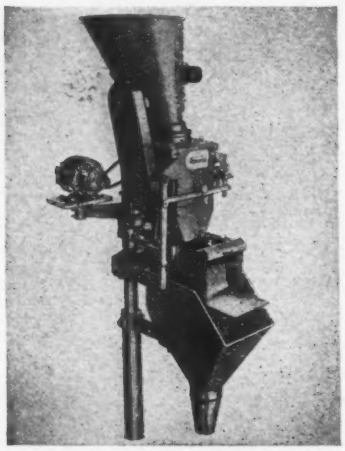
TOP SEALER—for glue-sealing tops of cartons. Other models available for folding liners and top tucking at speeds ranging from 25 to 100 per minute.



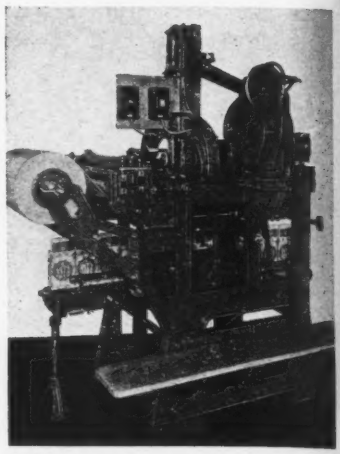
TIGHT WRAPPER—one of four machines for gluing printed tight wrappers to shells. Entire inside surface of wrapper is glued to insure strong sift-proof, insect proof package. Speeds from 40 to 70 per minute are entirely practical.



FOUR SCALE NET WEIGHT COFFEE WEIGHER—one of Pneumatic's 25 different types of gross and net weight weighers for handling free flowing and semi-free flowing materials. Speeds range from 10 to 100 per minute.



SEMI-AUTOMATIC ALL PURPOSE WEIGHER—two models for 2 oz. to 3 lb. loads of peas, beans, all grinds of coffee, rice, etc., in bags, tins or cartons.



CARTON LINER—cuts glassine, waxed or plain papers from a roll, then forms, seals and inserts the bag.

OVER 80 DIFFERENT AUTOMATIC AND SEMI-AUTOMATIC MACHINE MODELS FOR:

Carton Making	Bottom Sealing	Filling	Tight Wrapping
Feeding	Top Tucking	Weighing	Labeling
Forming	Top Sealing	Packing	Lining Closing
Bottom Tucking	Wax Tight Wrapping		Lining

also:

Bag Flour Packers	Shoe Box Machinery	Can Cappers
Double Package Makers	Can Fillers	Can Labelers
Tea Baggers		Powder Fillers



"LOWER COST PER CONTAINER"

PNEUMATIC
PACKAGING & BOTTLING MACHINERY

DOUBLE PACKAGE MAKER, AUTOMATIC FILLER & ROTARY TOP CLOSURE—a complete 3 machine hook-up for producing a package within a package. Pneumatic's new Double Package consisting of a printed carton with individual inner bag liner offers added insurance for your product against loss of flavor and freshness. An ideal container for dried fruits, pudding powders, gelatin desserts, confectioners sugar, prepared flour, individual servings of cereal, tea, coffee, etc. Send for a sample package today.

PNEUMATIC SCALE CORP., LTD., 77 Newport Ave., North Quincy 71, Mass

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PNEUMATIC "Start to Finish"

BOTTLING MACHINERY for BOTTLES — CANS — JARS

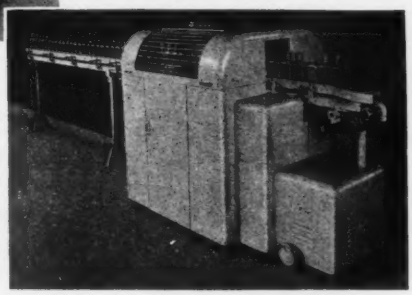
Pneumatic is the one machine builder offering a full line of cleaning, filling, capping and labeling machines designed to operate as individual units or in complete co-ordinated hook-ups.

CLEANING

Pneumatic's Inverted Air Cleaners assure thorough cleaning of new glassware. Containers while inverted are subjected to a blast of clean, dry air which completely removes all foreign matter.



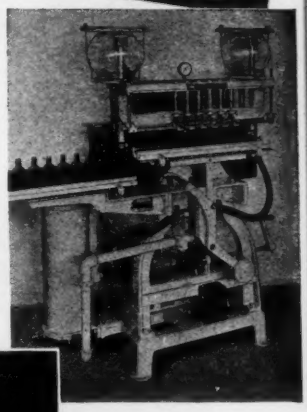
At Left—SEMI-AUTOMATIC INVERTED BOTTLE AIR CLEANER: Attendant holds two containers simultaneously and in one motion inverts them, thrusting the necks in the direction of the self-centering nozzle seal, where the air blast is received. Machine will handle a wide variety of bottle shapes and sizes at speeds ranging from 20 to 50 per minute.



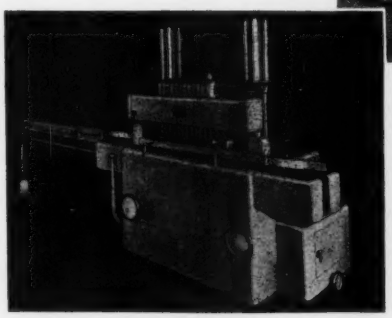
At Right — AUTOMATIC INVERTED BOTTLE AIR CLEANER: A fully automatic machine similar in operating principle to the Semi-automatic Cleaner. Will handle 3 oz. to 32 oz. bottles, jars or jugs at speeds up to 120 per minute.

FILLING

Illustrated are two of Pneumatic's several vacuum filling machine models for accurate filling of bottles, jugs, cans, and jars at speeds ranging from 20 to 120 per minute.



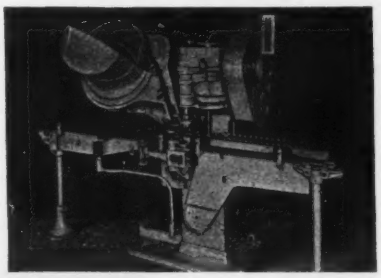
At Right—SAMCO JUNIOR VACUUM FILLER: For free-flowing or semi-free-flowing liquids in 1 oz. to 1 gal. cans, regular finish of AGST glassware. Parts change takes less than 15 minutes, therefore machine is particularly suited for short runs on a variety of products and container sizes at speeds up to 40 per minute.



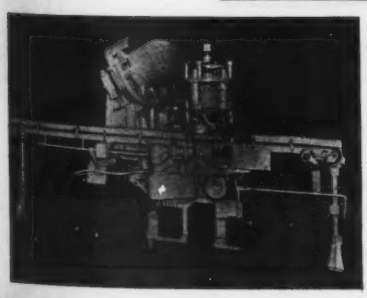
At Left—AUTOMATIC SAMCO VACUUM FILLER: Equipped with standard 12-heads this fully automatic machine is capable of speeds of 50/70 per minute on 1 oz. to 1 qt. sizes. Double bowl overflow system, high speed filling nozzles and quick size changes insure rapid dripless filling of free flowing or semi-free flowing liquids.

CAPPING

The flexibility of Pneumatic's Single-Head, Two-Head and Four-Head capping machine models makes handling of a wide size range entirely practical and relatively simple.



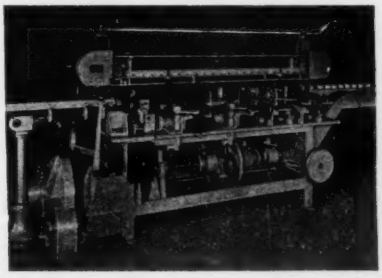
At Right—SINGLE HEAD CAPPER: Will sort, feed and apply any type of molded or metal turn-on closure to containers ranging from 1 oz. to 1 qt. at speeds up to 50 per minute. Machine is entirely automatic and requires less than 15 minutes for size change.



At Left—PNEU ROTARY CAPPER: A hi speed capping machine for handling a variety of sizes and shapes of bottles, cans, and jars at speeds up to 120 per minute.

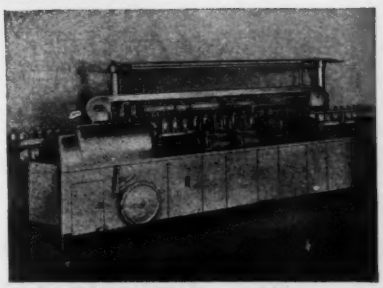
LABELING

Pneumatic's Simplex and Duplex Labelers safeguard the appearance of your containers by assuring precise, accurate register—dependable labeling at speeds up to 120 per minute.



At Left—SIMPLEX LABELER: One of several models for applying front only, front and back, two front and one back, or partial wrap-around labels to bottles, cans, and jars. Machine is fully automatic and can be changed from one size to another in less than 10 minutes.

At Right—DUPLEX LABELER: Will apply front only, or front and back labels to containers ranging in size from ½ pt. to quarts at speeds up to 120 per minute.

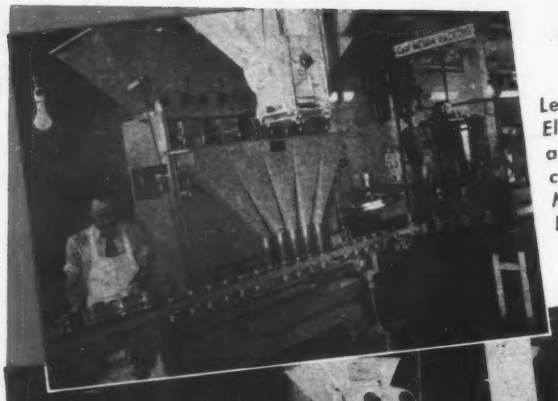


PNEUMATIC

PACKAGING & BOTTLING MACHINERY

PNEUMATIC SCALE CORP., LTD., 77 Newport Ave., North Quincy 71, Mass.

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Left: Five-section Elec-Tri-Pak Weigher automatically filling coffee cans at Morey Mercantile Company, Denver, Colorado.



Left: Triangle Elec-Tri-Pak Weigher and SR Carton Sealer packaging bread crumbs at Ward Baking Co., Cleveland plant.

TRIANGLE

AUTOMATIC and SEMI-AUTOMATIC

WEIGHERS • FILLERS

CARTON SEALERS

AUGER PACKERS

. . . and other equipment for packaging all dry products.



Above: Four double section Elec-Tri-Paks packaging cranberries at A. D. Makepeace Co., Wareham, Mass.

Below: Triangle Auger Packer filling spices in cans at David G. Evans Coffee Co., St. Louis.



TYPICAL TRIANGLE USERS AND PRODUCTS PACKAGED:

CONSOLIDATED AIRCRAFT	RIVETS
BLUE MOON FOODS	EGG POWDER
PORCELAIN ENAMEL & MFG. CO.	MUNITIONS
KIMBERLY-CLARK CORP.	PAPER PRODUCTS
KROGER GROCERY & BAKING CO.	MARSHMALLOWS
AGFA ANSCO CORP.	PHOTO SUPPLIES
SWIFT & COMPANY	FERTILIZER
COLGATE-PALMOLIVE-PEET CO.	SOAP FLAKES
SHERWIN-WILLIAMS CO.	INSECTICIDES
SPRATTS PATENT AMERICAN LTD.	DOG FOOD
GODCHAUX SUGARS	SUGAR
MYLES SALT CO.	SALT
CHRYSLER CORPORATION	AUTO PARTS
ARMOUR & COMPANY	SOAP POWDER
THE JELL-O CORPORATION	DESSERT PRODUCTS
QUAKER OATS COMPANY	FLOUR
FOULDS MILLING COMPANY	MACARONI

Write for data today on Triangle equipment to handle YOUR job.

TRIANGLE PACKAGE MACHINERY CO.

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DEXTER FOLDER COMPANY

330 West 42nd Street, New York, N. Y.

CHICAGO, 117 W. Harrison St. PHILADELPHIA, Room 387, Bourse Bldg. CINCINNATI, 1335 Paxton Street

Wire Stitching Machines for Stitching Shipping Containers, Folding Boxes, Set-Up Boxes, Bags, Etc.



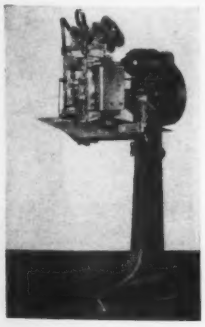
BLISS HEAVY DUTY BOX STITCHER

For stitching corrugated and solid fibre shipping cases, folding boxes, set-up boxes, food containers, display boxes and similar work. Bliss straight or 45° Heavy Duty Stitcher Head mounting, for handling the heaviest kinds of stitching at high speeds. Uses all ribbon and hybar wires and other round and flat sizes. Wide clearance (1⅝") between head and anvil. May be equipped with tables and gauges for special work. Throat lengths 15", 25" and 33".



IMPROVED LATHAM BOX STITCHER

Moderately priced machine for stitching the regular run of folding boxes, set-up boxes, suit boxes, paper bags, bottle carriers, display boxes and similar work. Also lighter weights of corrugated and solid fibre shipping containers. Uses .017 or .020 ribbon wire and No. 1 or No. 2 hybar wire. High speed. Throat length 12".



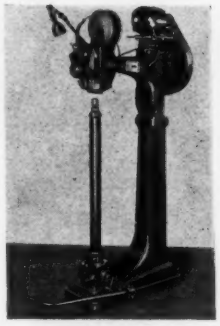
BOSTON MULTIPLE HEAD BOX STITCHER

May be equipped with two to four No. 15 Heavy Duty Boston Heads. Adjustable sidewise as desired. For stitching suit boxes, cartons, set-up boxes and other work requiring two or three stitches uniformly spaced. Uses ribbon, hybar and flat or round wires. Capacity up to ½" thickness. Minimum spacing of 3" from center to center of stitches. Maximum spacing 18"; 15" throat length.



BOSTON PORTABLE BENCH STITCHER

This stitcher may be taken to the work, rather than have the work carried to the stitcher. Intended for light stitching operations, such as sealing filled bags, attaching articles to cards, and making small boxes. Readily moved and attached to light socket. Solenoid operated foot trip, or may be furnished special for tripping by the work being stitched. Capacity ¼". 21 x 25 flat wire used. Throat length 4".



BLISS HEAVY DUTY BOTTOM STITCHER

For bottom stitching regular slotted containers in all grades and thicknesses of corrugated or solid fibre board, and where maximum production is required.

Operates at speeds up to 300 stitches per minute. 1⅝" clearance between post and stitcher. No adjustments for size of containers within its range. Built for long service on heavy duty work. Stitcher head detachable as a unit. Built in two sizes: 15" or 25" throat. Can be furnished to handle the usual sizes of box wire.



IMPROVED LATHAM BOTTOM STITCHER

Moderately priced machine, for bottom stitching corrugated and solid fibre shipping containers, in all the usual sizes, which do not require the heaviest kind of stitching. Has many features heretofore found only in highest priced stitchers. Stitcher head removable as a unit. 12" throat length.

Uses .017 to .020 ribbon wire; No. 1 or No. 2 hybar wire.



BLISS DUPLEX BOTTOM STITCHER

Drives two stitches simultaneously, increasing production 50% to 60% over single head stitchers. Popular in plants handling large quantities of containers for canned goods, bottled goods, soaps, etc. Stitches spaced 2½" apart. No adjustments for various sizes of boxes within its range. Uses Bliss Duplex Stitcher Head. Throat length 15". Stitches 2500 to 4000 boxes daily.

DEXTER ENGINEERING SERVICE

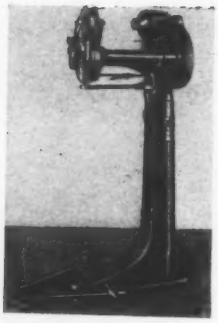
The Dexter Folder Company maintains a corps of engineers who have had extensive experience in packaging and preparing for shipment a great variety of products.

The services of our organization are available, without obligation to you, for making a survey of your packing and shipping departments to determine the most economical methods of handling and protecting your goods while in storage and transit—when they are no longer under your control.

Ask for literature on any of the stitchers shown here.

DEXTER FOLDER COMPANY

330 West 42nd Street, New York, N. Y.



BLISS COMBINATION BOX AND BOTTOM STITCHER

A general purpose machine which can be used either for regular box stitching by use of the box arm, or for bottom stitching of containers by use of the post. The box arm may be lowered and post placed in operating position. Output is the same as obtained on Bliss Box Stitcher or Bliss Bottom Stitcher. Built in two sizes, 15″ or 25″ throat. The Bliss Heavy Duty Stitcher Head is used.



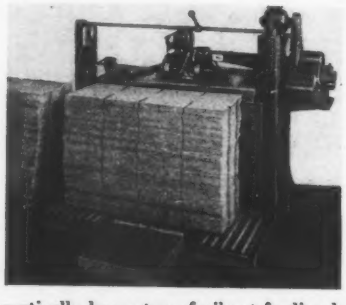
BLISS TOP AND BOTTOM STITCHER

This combination machine is used for both bottom stitching of slotted containers, and for top stitching them after they are filled. Change from bottom stitching to top stitching quickly made. Handles boxes up to 25″ in depth and from 15″ square for smaller machine to 33″ square for larger machine. Useful for products that must be shipped in completely wire stitched containers. Equipped with Bliss Heavy Duty Head. Made in three sizes, 15″, 25″ and 33″.



LATHAM BOX, BOTTOM AND TOP STITCHER

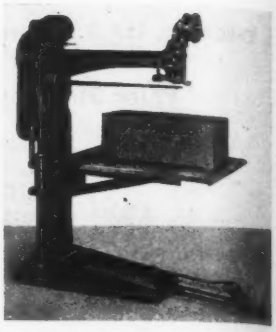
This combination stitcher is adapted for stitching bottoms and tops of medium and small boxes, used in small or large quantities. Also for assembling and stitching a variety of boxes. Vertical post for bottom stitching, box arm for box stitching, or blade anvil for top stitching are quickly detached or placed in operating position. Table accommodates boxes from 2″ to 33″ in depth and from 12″ x 12″ square to 3″ x 3″ square.



BLISS AUTOMATIC RSC STITCHER

The Bliss Regular Slotted Container Stitcher with Dexter Automatic Elevator produces at rate of 1500 to 2000 average size slotted containers per hour with one operator. Elevator accommodates 3½ foot pile of stock, and automatically keeps top of pile at feeding level as blanks are fed off. Feed table is quickly lowered for next load. The folded blank pushed against a stop trips solenoid operated clutch, and blank is automatically fed through and stitched, with stitches evenly spaced in accordance with predetermined setting. Spacing of stitches is within a range of 1½″ to 3″ between stitches. Tie stitches may be driven at each end.

Stitches wide range of sizes, representing approximately 90% of boxes produced. Uses Bliss Heavy Duty Head with 45° stitch. ¾ H.P. motor for stitcher; ¼ H.P. for elevator.



BLISS POWER LIFT TOP STITCHER

Recommended for top stitching large quantities of containers. Suitable for conveyor installations as table is adjustable to height of conveyor line, permitting filled containers to be transferred to the table without lifting. Power operated work table automatically stops in right position for top stitching. Equipped with Bliss Heavy Duty Stitcher Head. 33″ throat length. One motor operates table and stitcher.



BLISS QUICK LIFT TOP STITCHER

Used for wire stitching the tops of regular slotted containers and Bliss Boxes.

The table is supported by the Bliss quick lift mechanism which is positive in action an instantly adjustable up and down. Raising and lowering of table is facilitated by the use of counterbalancing springs.

Equipped with Bliss Heavy Duty Stitcher Head. Built in three throat lengths, 15″, 25″ and 33″, accommodating boxes up to 33″ long, 33″ wide and 28″ deep.



BLISS DIAGONAL HEAD RSC STITCHER

Drives stitches at 45° angle to the manufacturer's seam. The Bliss open head device is rigidly attached to the stitcher head casting and is self-supporting. Clincher anvil does not rest on the box blank, thus preventing crushing of corrugations. Clinching anvil available for stitching double wall A-B and A-A Corrugated boxes. Built in 32″, 38″ and 48″ throat lengths. May be equipped with mechanical foot trip or with movable solenoid operated foot switch. Motor is ⅓ H.P.



WIRE, PARTS SERVICE

Under normal conditions replacement parts and the usual sizes of wire are carried at all Dexter offices, for prompt delivery. Due to the present emergency, these items are subject to priorities imposed. Mechanical services are available at all offices.

DEXTER FOLDER COMPANY

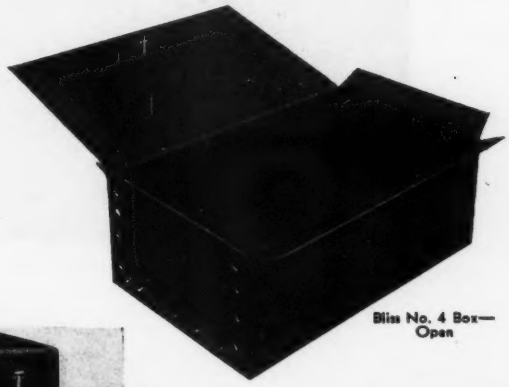
330 West 42nd Street, New York, N. Y.

TYPES OF BLISS BOXES



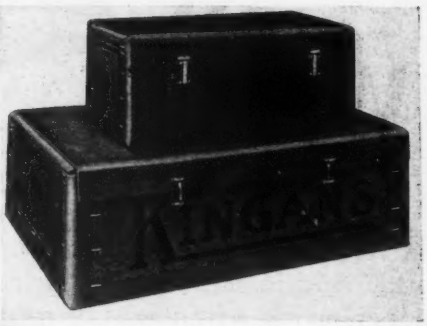
No. 2 Bliss Box—Open

The most popular types of Bliss Boxes are the No. 2, No. 4 and No. 4-2 models.



Bliss No. 4 Box—Open

When No. 2 Box is assembled, the flanges form a double thickness of board on all vertical seams on the sides, and on horizontal seams at each end of the box.



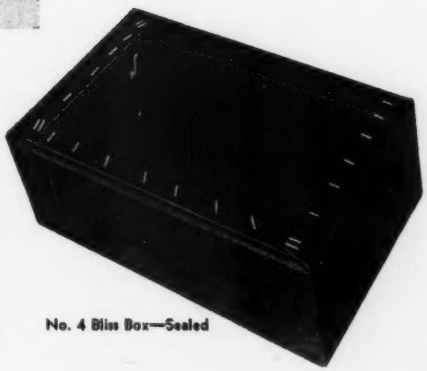
When No. 4 box is assembled the three flanges form a double thickness on the ends, which gives added protection for canned goods and other commodities where an end thrust of the contents is to be guarded against.



No. 2 Bliss Box—Sealed

This New Bliss Wire-Lock Seal Box may be sealed, opened for inspection and re-sealed without damage to the box.

Wire stitches with arched crown attached to top panel and body of box provide means for locking the cover with wire or strips of metal which may be sealed with lead seals. Such seals are readily broken without damage to the box and after inspection or repacking new seals may be applied. This box, with arched wire seals attached, is manufactured by leading container companies.



No. 4 Bliss Box—Sealed

ADVANTAGES OF BLISS BOXES

Packing goods in BLISS BOXES assures the manufacturer of the greatest possible margin of safety to his goods while stored and in transit. The three-piece construction, with all vertical seams reinforced, makes the BLISS BOX the strongest corrugated or solid fibre container obtainable.

The special method of construction of the Bliss Box offers greatly increased resistance to all types of stresses, whether from within or without the box.

Bliss Boxes are economical because they contain no waste stock. The saving in material and freight charges reduces the total cost an average of 10% and in some instances as much as 20% when compared with other types of fibre containers. The extra strength of the BLISS BOX also often permits the use of lighter board which effects an additional saving.

Blanks for BLISS BOXES are manufactured by nearly all leading board mills and box factories in the United States and Canada and are therefore as readily obtainable as other types of shipping containers. A complete list of manufacturers will be furnished on request.



PLAN NOW

for post-war printing equipment!

To obtain earliest possible delivery of your post-war package printing equipment, plan your post-war requirements *now!* And in setting up those requirements, consider carefully the marked time- and money-saving advantages of rotogravure!

The dry print of gravure inks eliminates drying time between operations and results in greater production capacity. With such instant drying inks it is possible for you to print any number of colors, one on top of another, and fabricate or rewind the printed stock without offset!

The simplicity of the gravure principle eliminates makeready, permits rapid changeovers and puts an end to many of the difficulties of register control encountered when drying-time must elapse between colors or between printing and fabricating.

The Speedry enclosed ink fountain—a patented feature of all CHAMPLAIN* rotogravure presses—permits a completely new conception of ink application. The ink remains uniform; no splashing onto the web is possible; and the fountain protects the ink from foreign particles. Highly volatile solvents may be used without fear of evaporation in the fountain.

The wide variety of stocks that have been printed successfully by rotogravure include label, coated, super, news, manila, English finish, tissue and kraft papers; spruce sulfite, chip, clay and patent coated paper boards; and miscellaneous stocks such as flint glazed, foil, cellulose acetate, cellophane and glassine.

Champlain's manufacturing facilities are now producing precision-built war matériel. Our representatives, however, are prepared *now* to help you formulate your post-war printing plans and determine your press requirements.



Write For This Free Booklet Today! *Write today for "Advantages of Gravure for Package Printing," a colorful, illustrated booklet which tells how you can print packages and labels more economically and more attractively by rotogravure! Write to Champlain Division of Interchemical Corporation, 636 Eleventh Avenue, New York 19, N. Y.*

*Reg. U.S. Pat. Off.

CHAMPLAIN

DIVISION OF INTERCHEMICAL CORPORATION

MAKERS OF ROTOGRAVURE, ANILINE AND TYPOGRAPHIC PRESSES

Include

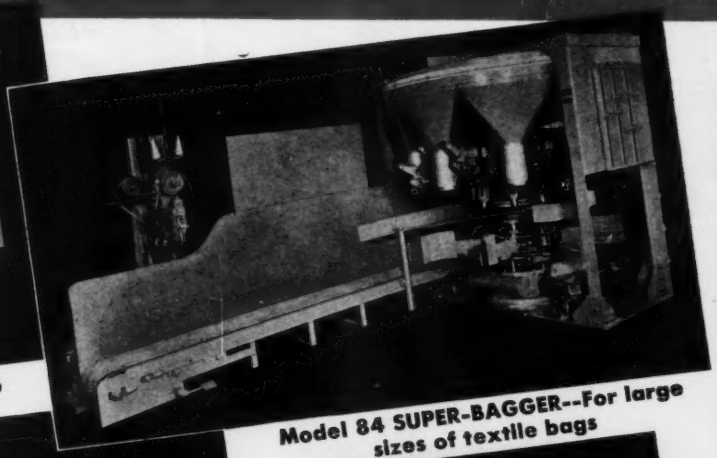
CONSOLIDATED EQUIPMENT

IN YOUR POST-WAR PLANS

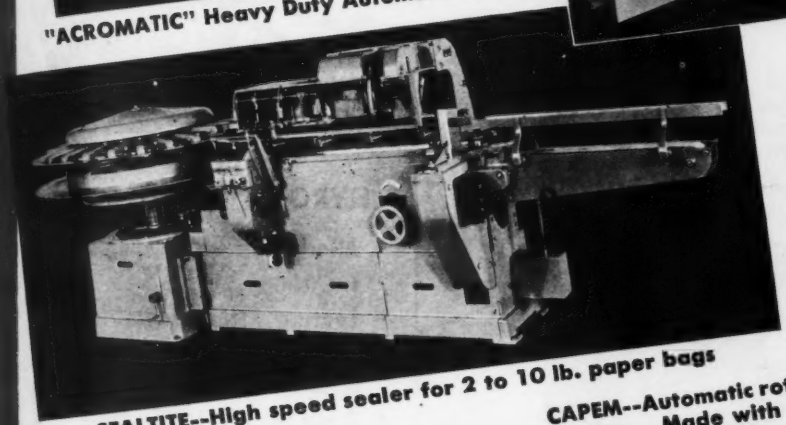
We offer the benefit of our broad experience to any manufacturer with a packaging problem. You may save time and money in getting back into normal production by getting the recommendations of a Consolidated engineer before proceeding too far with your post-war plans. Let us work with you.



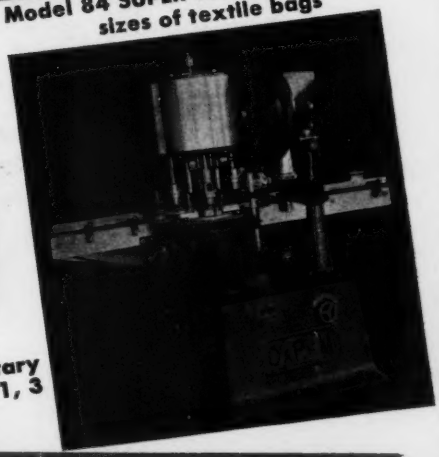
"ACROMATIC" Heavy Duty Automatic Scale



Model 84 SUPER-BAGGER--For large sizes of textile bags



SEALTITE--High speed sealer for 2 to 10 lb. paper bags



CAPEM--Automatic rotary capper. Made with 1, 3 or 4 spindles

CONSOLIDATED

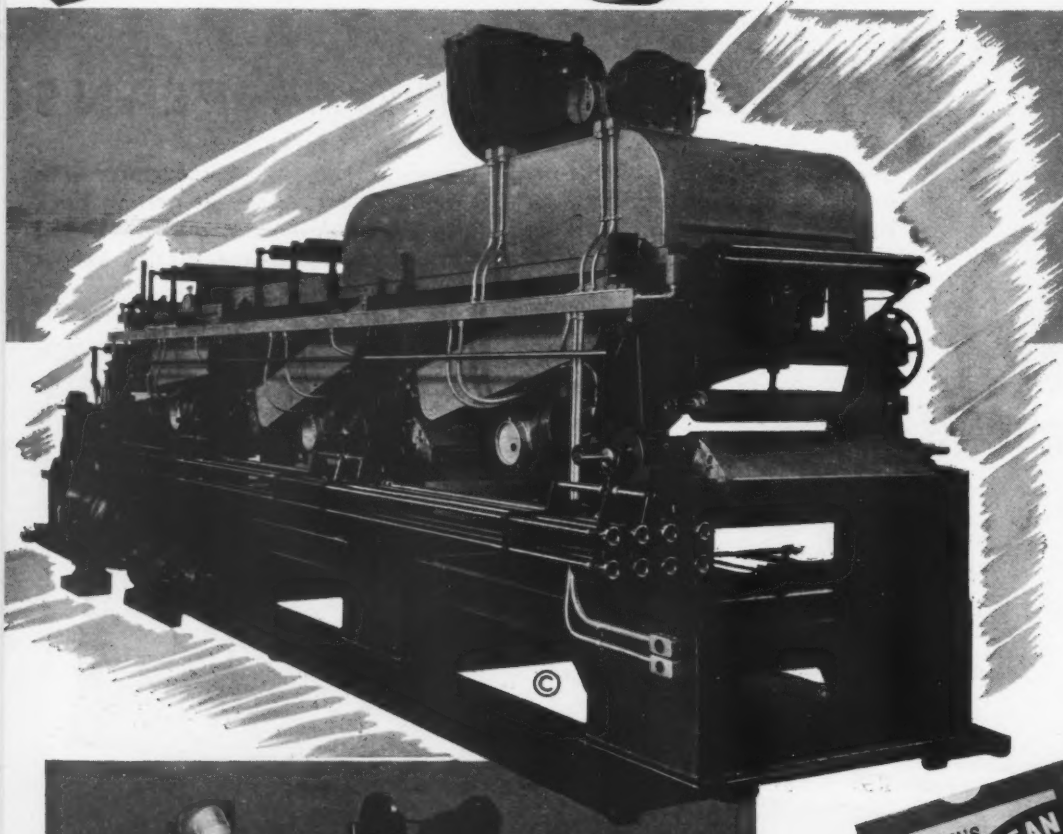
PACKAGING MACHINERY CORP.

1400 WEST AVENUE BUFFALO 13, N. Y.

HYROTO

Converting Equip me

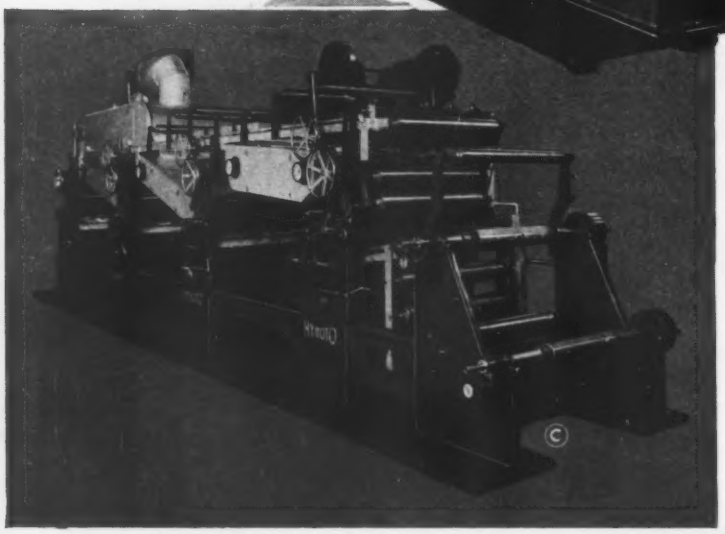
PAPER, CARDBOARD, FOIL, KRA



Two views of C-30 (handles widths 6" to 30")

Front View (top)

Rear View (bottom)





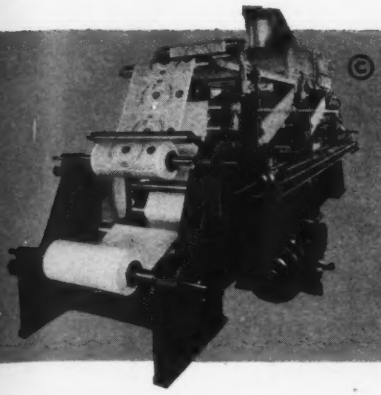
SPECIAL HYROTO FEATURES

- Attachments for Sheeting or Rewinding
- Coating Attachments for Over-All or Spot-Coating One or Both Sides
- Prints Color Both Sides Once Through
- Laminates Two or More Webs
- Converts to Bags, Wraps, Labels, Inserts
- Made in Sizes to Meet Requirements

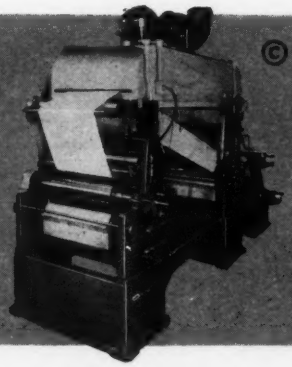


...ment for COATING, PRINTING & LAMINATING

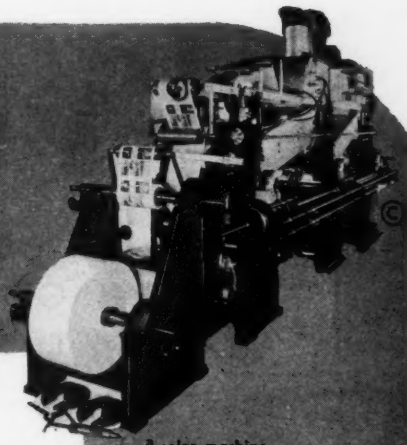
...OIL, KRAFT, CELLOPHANE, PLIOFILM, TISSUES, FABRICS



3-color machine
B-26 (handles widths 4" to 26")



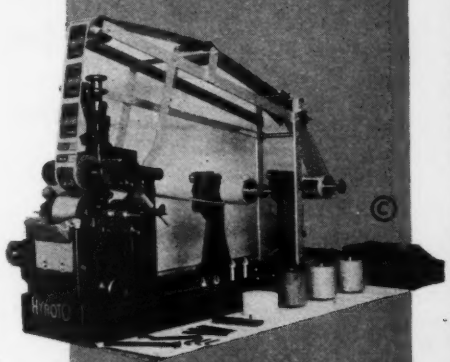
2-color machine
B-20 (handles widths 4" to 20")



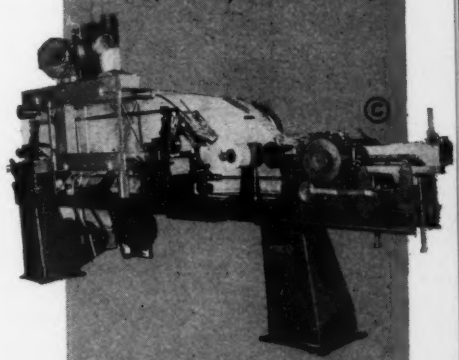
3-color machine
B-10 (handles widths 4" to 10")

HYROTO machines coat and spot-coat, color-print on one or both sides (in register in all colors), laminate two or more webs, deliver the finished job in rolls or sheets.

They perform at high speed, applying cold or hot fluids such as inks, lacquers, anilines, waxes, adhesives, metallics to papers, cardboard, foil, kraft, cellophane, Pliofilm, tissues, fabrics, leathers and other materials. These machines are being used by converters, printers, bag makers, box makers and label and wrap makers. They are available in all sizes ranging from a laboratory table-sized model to full-scale large production machines.



1-color machine
A-4 (laboratory—widths ½" to 4")



2-color machine with sheeter
A-4 (handles widths ½" to 4")

HYROTO

ROTOGRAVURE ENGINEERING CO.

299 MARGINAL STREET, EAST BOSTON 28, MASSACHUSETTS

Our Pledge

TODAY, all of our energies, our facilities, our available materials are pledged to the successful prosecution of the war and the achieving of a swift victory and lasting peace. That is as it should be!

On the day that peace is declared, Sav-Way will announce to industry a development of major importance to every manufacturer whose peacetime program will include the production of plastics—plus a series of mechanical products that will fill a recognized need in the consumer market.

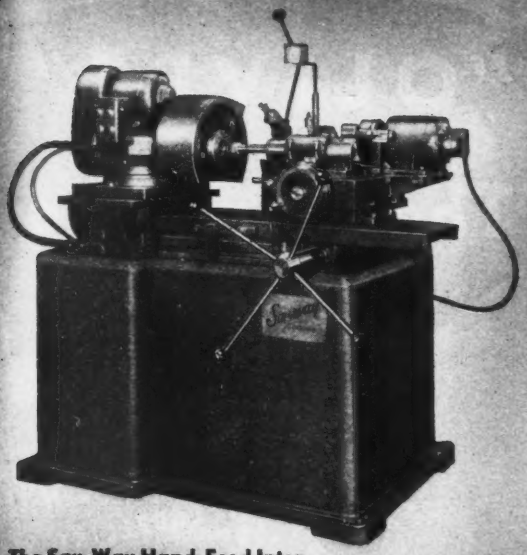
Signed

Tom Saffady

DETROIT
October 1, 1943

Sav-Way Industries

Sav-Way's Contribution to War Production—



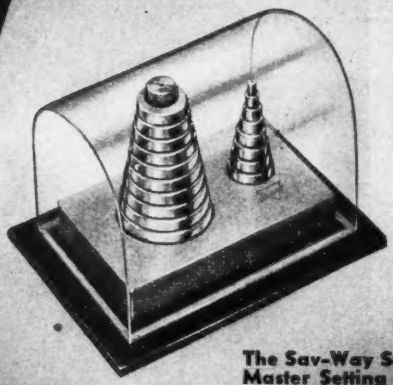
The Sav-Way Hand-Feed Internal Grinder is ideal for handling a large variety of work with high efficiency and precision—the perfect tool room grinder. It's neoprene insulated against vibration, distortion, and misalignment.



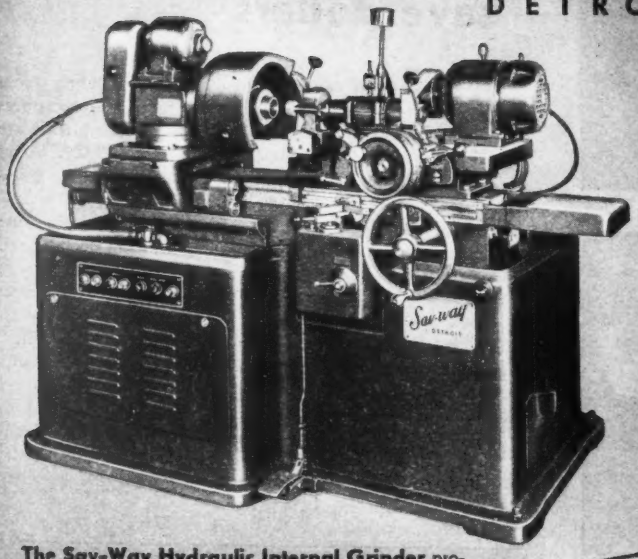
The Sav-Way Master Set of Standard Plug Gages consists of 147 plugs in increments of 1/64ths, starting at 1/4" and going to 1". Three plugs of each nominal size—.0005" over, standard, and .0005" under. Contained in a unique plastic case with transparent cover.

Sav-way

DETROIT



The Sav-Way Set of Master Setting and Checking Rolls for checking micrometers and other precision measuring devices makes possible a new degree of production accuracy.



The Sav-Way Hydraulic Internal Grinder provides both power and hand-feed, each independent of the other. Topping a long list of important features is neoprene insulation between the base and the bed, insuring permanence of alignment and a high degree of accuracy.

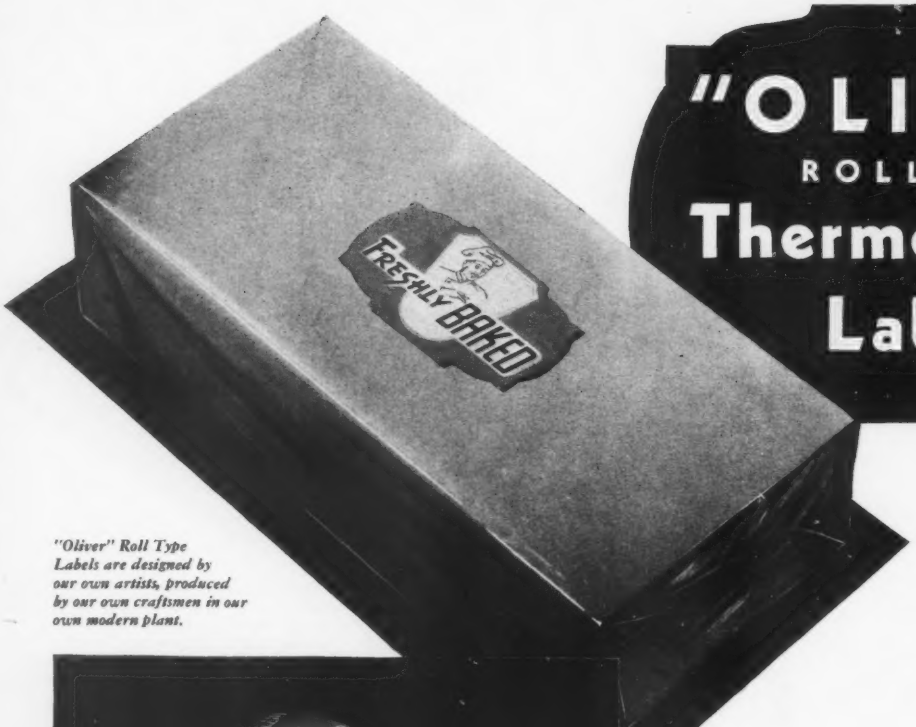


The Sav-Way Gold Seal Spindle—"The Spindle that Breathes"—was produced specifically to meet the requirements of round-the-clock war production schedules. It is setting outstanding production records where other spindles have failed.

PLUS—THE PRODUCTION OF PRECISION PARTS RELATED TO AIRCRAFT, AUTOMOTIVE, AND ORDNANCE

"OLIVER"
ROLL TYPE
Thermoplastic Labels

Used with the "OLIVER" LABELLING ATTACHMENT



"Oliver" Roll Type Labels are designed by our own artists, produced by our own craftsmen in our own modern plant.

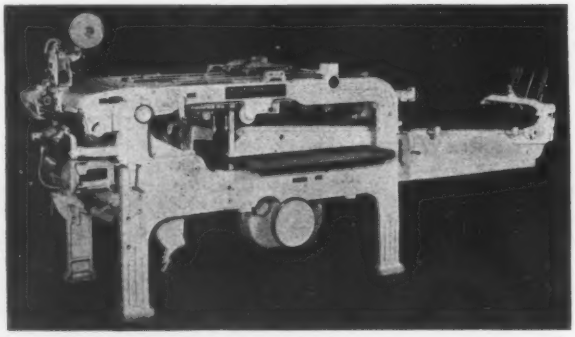


simplify production
save time
save dollars

NOW you can use attractive diecut labels from rolls, and heat-seal them to your wrappers with the "Oliver" Roll Type Labeller. These rolls are low in cost, easy to stock and handle, and save hours daily. Heat-sealing avoids the use of liquid glues and constant cleaning.

The "Oliver" Labeller automatically heat-seals one thermoplastic label at a time in almost any desired position on the package. Can be sealed to any type wrapper—cellophane, glassine, wax, etc. The diecut labels are attached end to end, and separated by an accurately timed cut-off knife just before application.

"Oliver" Thermoplastic Labels are now being successfully used by hundreds of the nation's leading food plants. The Roll Type Labeller can be attached to most types of wrapping machines. It is also offered as part of special machines designed for labelling only. Investigate the advantages of the Roll Type Labeller and Thermoplastic Labels.



"OLIVER" VARIETY WRAPPER Overwraps small and large cartons, open-top boxes, and wraps irregularly-shaped items on U-boards. Quick and easy adjustability make it ideal for both long- and short-volume items. To change from end-fold to underfold can be done quicker than we can tell it. Wrapper tension instantly adjustable to correct degree. Automatic Cardboard Folder and Feeder—another important money-saver. Makes an extra strong seal. The entire machine is so simply designed that a girl can easily operate!

For Complete Information Write to the

Packaging Division

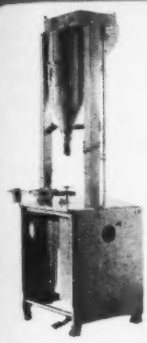
OLIVER MACHINERY COMPANY

GRAND RAPIDS 2, MICHIGAN

XUM

S&S FILLING · PACKAGING · WRAPPING MACHINES

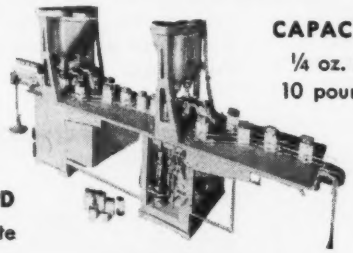
"Better Machines for Better Packages"



FILLING MACHINES

SEMI-AUTOMATIC
FULLY-AUTOMATIC
SINGLE and DUPLEX TYPES

FILLS
CANS • JARS • BOXES • CANISTERS



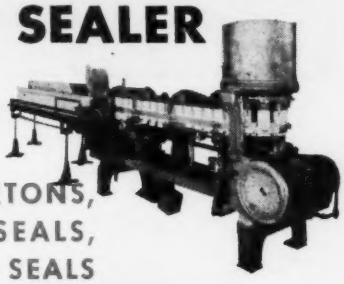
MATERIALS
Pastes — Powders
Granular Products
or any Free Flowing
Materials

CAPACITY
¼ oz. to
10 pounds

PRODUCTION SPEED
15-30-60-120 per minute

NEVERSTOP CARTON FILLER and SEALER

Several Models



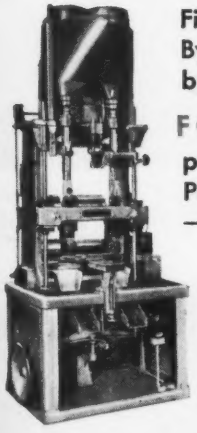
FEEDS CARTONS,
BOTTOM SEALS,
FILLS, TOP SEALS

MATERIALS
All Food and Grocery Products in Cartons

CAPACITY
Maximum Carton — 10½" x 6½" x 4½"
Minimum Carton — 2¾" x 1⅝" x ¾"

PRODUCTION SPEED: 40 to 120 per minute

TRANSWRAP PACKAGING MACHINE



Filling by measurement or counting. By auger or centrifugal feed—or, by hand feed.

FORMS • FILLS • SEALS
packages made of Cellophane, Pliofilm or other heat sealing films *— from the roll — plain or printed.*

MATERIALS
Coffee — candy — nuts — crackers — pills
powders — individual pieces.

CAPACITY
⅛ oz. to 1 lb. — volume not over 56 cu. in.

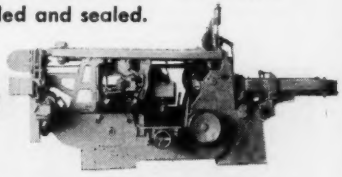
PRODUCTION SPEED
50 to 60 per minute

TIGHT WRAPPING MACHINE

Automatic

TIGHT-WRAPS CARTON
WITH PRINTED LABEL
after it is filled and sealed.

Makes attractive, siftless, tight-wrapped package



MATERIALS: All products in cartons

CAPACITY
Maximum Carton — 10" x 6½" x 4"
Minimum Carton — 3¾" x 1½" x 1"

PRODUCTION SPEED: 60 to 70 per minute

STOKES & SMITH Co.
Packaging Machinery — Paper Box Machinery
FRANKFORD, PHILADELPHIA 24, PENNA.

WRITE FOR LITERATURE

XUM

LAMSON CORPORATION

1003 Lamson St., Syracuse 1, N. Y.

Manufacturers of Conveyor Systems and Pneumatic Dispatch Tubes

Boston
New York
Cheshire, Conn.
Philadelphia

Baltimore
Washington
Atlanta
Cleveland

Detroit
Cincinnati
Chicago
St. Louis
Dallas

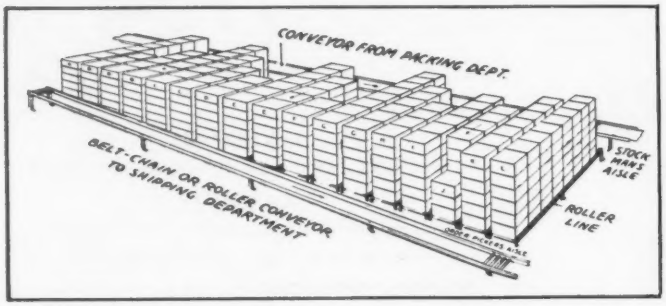
Houston
San Francisco
Los Angeles
Seattle



Straight-line production in Striethmann Biscuit Company's new plant. Two main line belts are shown bringing double lines of cartons through closers.

Lamson Conveyors and Lamson Dispatch Tubes are the tools which modern plants are using to (1) reduce human handling with the resulting speed-up in production; (2) to hold costs to a profitable level. Each system coordinates with the other toward a planned result. Conveyors speed up materials and processes; dispatch tubes speed up methods and paper work.

Complete Engineering Service—Lamson Corporation not only supplies a complete line of package conveyors but also has an engineering department experienced in the application of Lamson equipment to package handling problems. Factory trained resident engineers are always available for free consultation.



Here is Lamson's unique plan for the consecutive handling of stock in and out of storage. Order pickers need not hunt for stock—it moves to them as they require it.



Where the Tube Carrier goes is shown by this indicating ring which is set by the person sending it.



Dispatch Tubes save time and thousands of steps daily for Butler Bros., large wholesalers of Minneapolis.



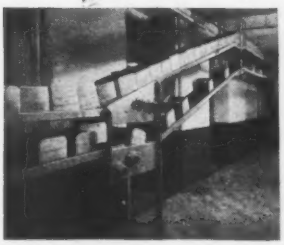
Cartons move at a handy working level over this live-roll switching conveyor at General Mills.



Filled bags are moved from the filling and weighing operations through the stitchers by this Lamson Uniplate Belt Conveyor at Russell Miller Milling Co.



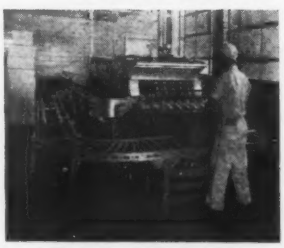
Merchandise orders are assembled by trucks hauled by an Overhead Conveyor in this Atlantic and Pacific Tea Company's warehouse.



Two-way Belt Conveyor at Ontario Biscuit plant. Top belt brings empty caddies from floor above. Lower belt takes filled caddies to shipping or storage.



Standardized for package loading and storing, this adjustable reversible Utility Conveyor has many uses around the average plant.



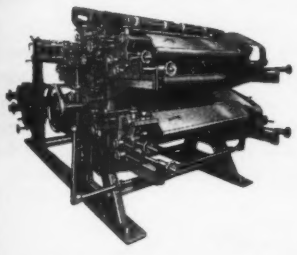
Into the "soaker" go the bottles while the "empties" move by Conveyor to the capping machines for refilling. Syracuse Guernsey Dairy.



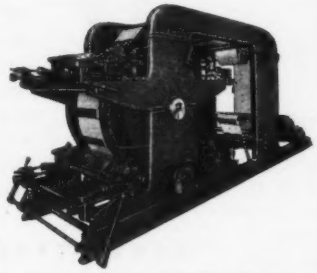
Extensive order assembly system designed to handle 50,000 packages a day for a large midwestern food wholesaler.



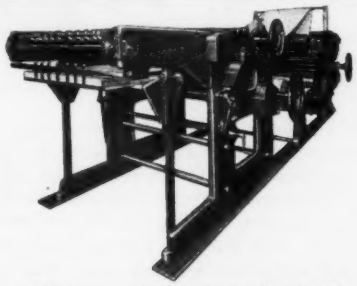
THOSE attractive wraps which will appear on your post war packages will have greater appeal and versatility if they are laminated, coated, decorated and embossed on Hudson-Sharp equipment.



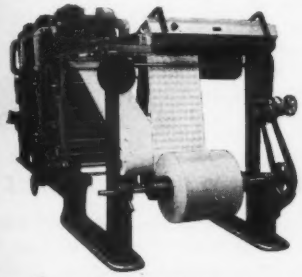
Standard Stack Type Aniline printing press — four colors.



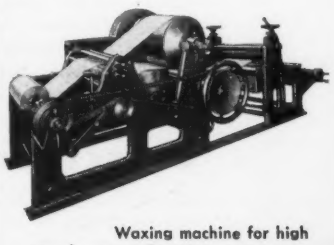
Standard Arc Type Aniline Press — Four colors operating against single tympan roll.



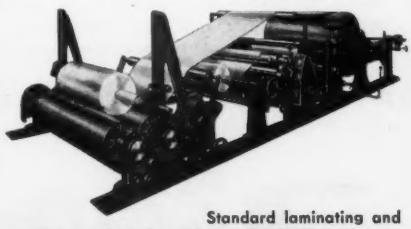
Aniline press with sheeter equipped with jogger and low rater.



Three color rotogravure press with complete drying equipment.



Waxing machine for high speed wet or dry wax papers.



Standard laminating and coating machine for roll to roll or roll to sheeter.

YOU may now arrange for a place on our production schedule for post-war delivery. This will apply only on our standard machines. Send us your specifications on the equipment you will require.



HUDSON-SHARP

MACHINE CO • GREEN BAY • WIS

Printers, Embossers, Folders, Interfolders, Waxers, Laminators, Wrapping Machines, Core Winders, Packaging Presses, Crepers and Napkins, Toilet Tissue and Paper Towel Units.

HORIX MANUFACTURING CO.

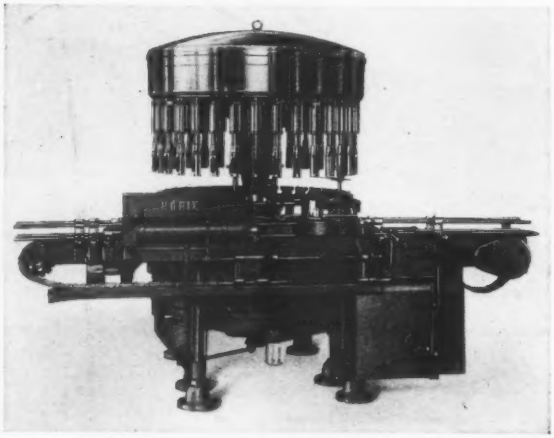
PITTSBURGH (4), PA.

Manufacturers of HORIX, HALLER, and BERGMANN Filling and Conveying Equipment

PRODUCTS HANDLED

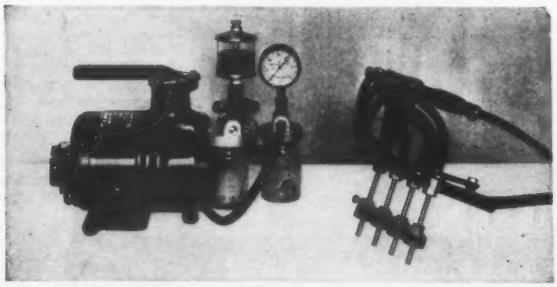
Whiskey	Bluing	Medicines	Chili Sauce
Wine	Catsup	Extracts	Tomato Pulp
Liqueurs	Vinegar	Drugs	Ice Cream
Gin	Syrup	Insecticides	Cottage Cheese
Water	Brine	Fruit Juices	Sour Cream

AUTOMATIC ROTARY FILLERS



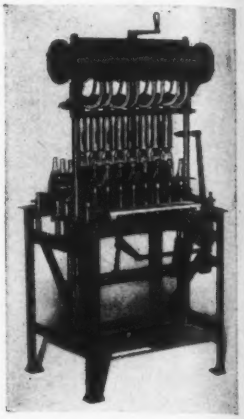
Suitable for plants requiring maximum continuous speed with minimum labor. Feed, filling and discharge are completely automatic. Automatic safeties prevent damage and lost time due to defective containers. Bottle Fillers available in 7, 9, 14, 18, 21, 24, 28, and 32-valve sizes, will fill all types of containers, up to 400 a minute. Can Fillers are built with 6, 10, 12 or 18 valves to suit special requirements, filling soups, fruit juices, etc., and syruping or saucing beans, spaghetti, etc., at speeds up to 250 a minute. Operate with all standard washers or closing machines. Quickly adjusted to different sizes of containers. Fill uniformly, without drip or waste. Easily dis-assembled for cleaning or adjusting. Sturdily constructed to insure dependability and long life. Safety devices automatically stop the machine in case of jams at infeed or discharge, and prevent damage to filling machine and costly production delays due to choke-neck bottles.

PORTABLE VACUUM FILLER



A simple, easily-operated machine of wide adaptability. Consists of compact motor-pump unit, with built-in switch; light-weight filling head, with quickly adjustable valves; over-flow jar; necessary hose connections. Motor can be attached to any light socket. Filling head balanced to minimize fatigue. Corrosion-resisting contact parts, easily cleaned, furnished to suit requirements.

MODEL NV STRAIGHT-LINE FILLER



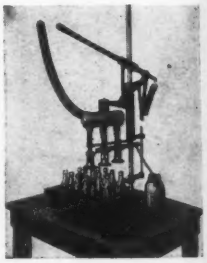
Ideal for filling small lots of different products into a variety of containers. Handles any shape or size of bottle from 4 oz. to 1 gal. Change from one size container to another is quickly and easily made. Empty bottles are fed by hand. Fills 4 to 12 bottles at a time, depending on their size. Whiskey can be filled at rate of 45 pt. a min. Filled bottles can be discharged onto a moving conveyor. Does not require expert mechanics for satisfactory operation. Exclusive Gravity-Vacuum System prevents loss due to defective bottles. All parts accessible for cleaning. Corrosion-resisting contact parts can be supplied.



PLUNGER-TYPE FILLERS

Hand-operated Plunger Fillers accurately and quickly measure Ice Cream, Cottage Cheese and Sour Cream into containers. Simple, no complicated parts to get out of order, easy to clean. Exclusive double-action gives greater production with less labor. Change from various size containers easily made. Motor-operated Fillers made to handle Preserves, Relishes, Mayonnaise, and other semi-solid products.

BENCH-TYPE FILLERS



Simple, efficient machines that will quickly save their moderate cost by doing away with loss of product. By use of special feed trays, various size containers can be handled, at speeds of 10 to 20 a minute, depending on product and size of container. Fills cans and jugs, as well as bottles, from miniatures to $4^{3}/_{8}$ in. diameter bottles.

CONVEYORS AND WORK TABLES

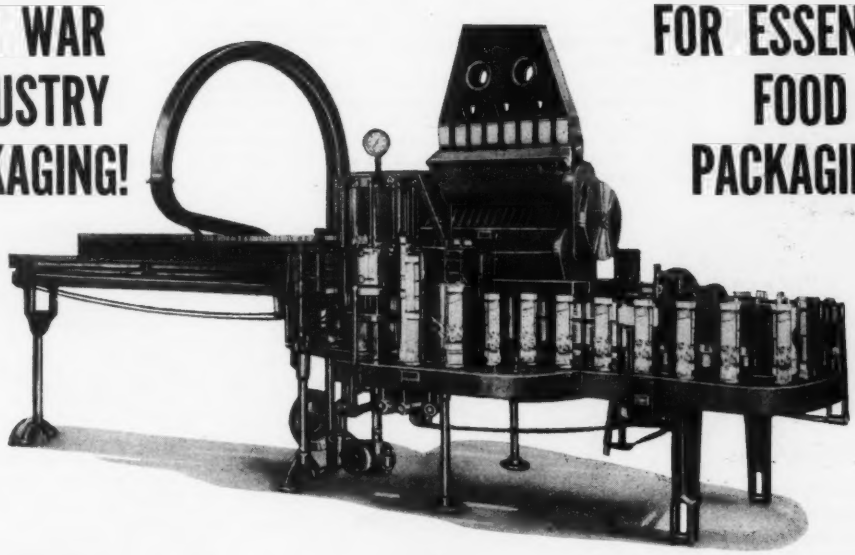
Chain Conveyors, which speed up production and save labor, can be furnished, with Semi-Automatic Corkers, to meet all requirements. Work Table Conveyors, for capping, corking, labeling and inspecting, can be supplied to order. (See cut below.) Frame of heavy angle iron, rigidly braced. Legs ajdustable.



PACKOMATIC PACKAGING MACHINERY

FOR WAR INDUSTRY PACKAGING!

FOR ESSENTIAL FOOD PACKAGING!



PACKOMATIC PRODUCTION MACHINES FOR EVERY PACKAGING PROBLEM

Shipping Case Sealing Machines
Shipping Case Printing Machines
Carton Making Machines
Carton Sealing Machines
Paper Can Tube Cutters
Paper Can Shrinking Machines
Paper Can Labeling Machines
Paper Can Set-Up Conveyors
Paper Can Tube Gluers
Paper Can Automatic Cappers
Consecutive Numbering Machines
Automatic Net Weight Scales
Automatic Volumetric Fillers
Automatic Boxing Machines
Auger Packers—Dating Devices

PACKOMATIC CARTON SEALING MACHINE with AUTOMATIC CARTON FEED AND NET WEIGHER

A high production unit, complete with automatic carton feed, eight-bucket scale, and bottom and top carton sealer. Entirely automatic in operation and no operator is required except to replenish carton supply in magazine when necessary.

Unit, with exception of automatic carton feed, is convertible for a wide range of carton sizes. Automatic scale receives eight cartons at a time, fills net weight into them, and discharges them on return conveyor for top sealing. Commercially accurate weights are guaranteed. Operating speed of up to 60 or more per minute.

It has been our business for over twenty years to build automatic machinery and equipment for speeding up production of foods, and other products. Packomatic machines are working night and day throughout the U. S. A. and in many other countries of this world at the job of high speed food production.

If you are packing necessary foods, or other products essential to the War effort, we can help you.

We are represented in all principal cities.
Our Engineers are anxious to serve you.
We're as close to you as your telephone.

PACKOMATIC

PACKAGING MACHINERY

J. L. FERGUSON COMPANY, JOLIET, ILLINOIS

REPRESENTED IN ALL PRINCIPAL CITIES

Exact Weight Scales for Every Operation in present Modern Packaging

PRODUCTS—Quality pre-determined weight scales for modern packaging; checkweighing, controlling automatics, hand weighing.

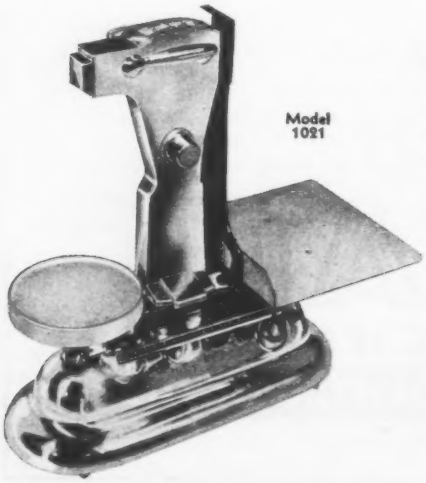
Revolutionary changes have taken place in wartime packaging. Foils, metals and other critical materials have been replaced by paper, carton and plastics. One thing has not changed—weights are still in pounds and ounces. Smaller packages prevail. What is required now is more accuracy than ever with added speed of operation.



SHADOWGRAPH

The SHADOWGRAPH is a revolutionary advance in precision weighing. A light ray replaces mechanical indication to allow reduction in working parts thus producing greater accuracy and speed. Noiseless in operation—instantly ready to weigh by plugging into any electrical outlet. Featuring extremely fine sensitivity SHADOWGRAPH is dependable and accurate in any high speed modern packaging operation.

Model 1021 (below) is designed for carton, box and can packaging and weighing. Ideal for candy, lard, broken eggs or any product packaged to exact weight. Equipped with a top reading dial for floor or low bench operation. It requires no leveling for uneven floors. Comes with carrying handles for easy transportation in the plant. Accurate to ¼ oz.—Capacity to 53 lbs.



Model 1021

Model 213



Model 213—End Tower construction for fast multiple checkweighing operations. Fits any production line—is trouble-free in operation—ideal for present day small packages of dehydrated foods and drugs. Accurate to ⅛ ounce—Capacity to 3 lbs.

Model 273



Model 273—End tower construction completely changes all standards by which modern high speed over and under weight scales are to be judged. Features—Short platter fall which multiplies operating speed and this feature materially reduces scale depreciation—compactness—less space on the bench—fits any production line—uninterrupted straight line production across the scale—heavier construction for added ruggedness. Accurate to ⅛ oz. — Capacity 12 lbs.



Model 8003

Model 8003—The COLUMBUS, a general purpose scale furnished in white enamel or nile blue as preferred. Features center tower construction with indicator travel of one inch to one ounce . . . . thereby removing the last excuse for inaccuracy in all checkweighing operations. Accurate to ⅛ oz. —Capacity to 12 lbs.

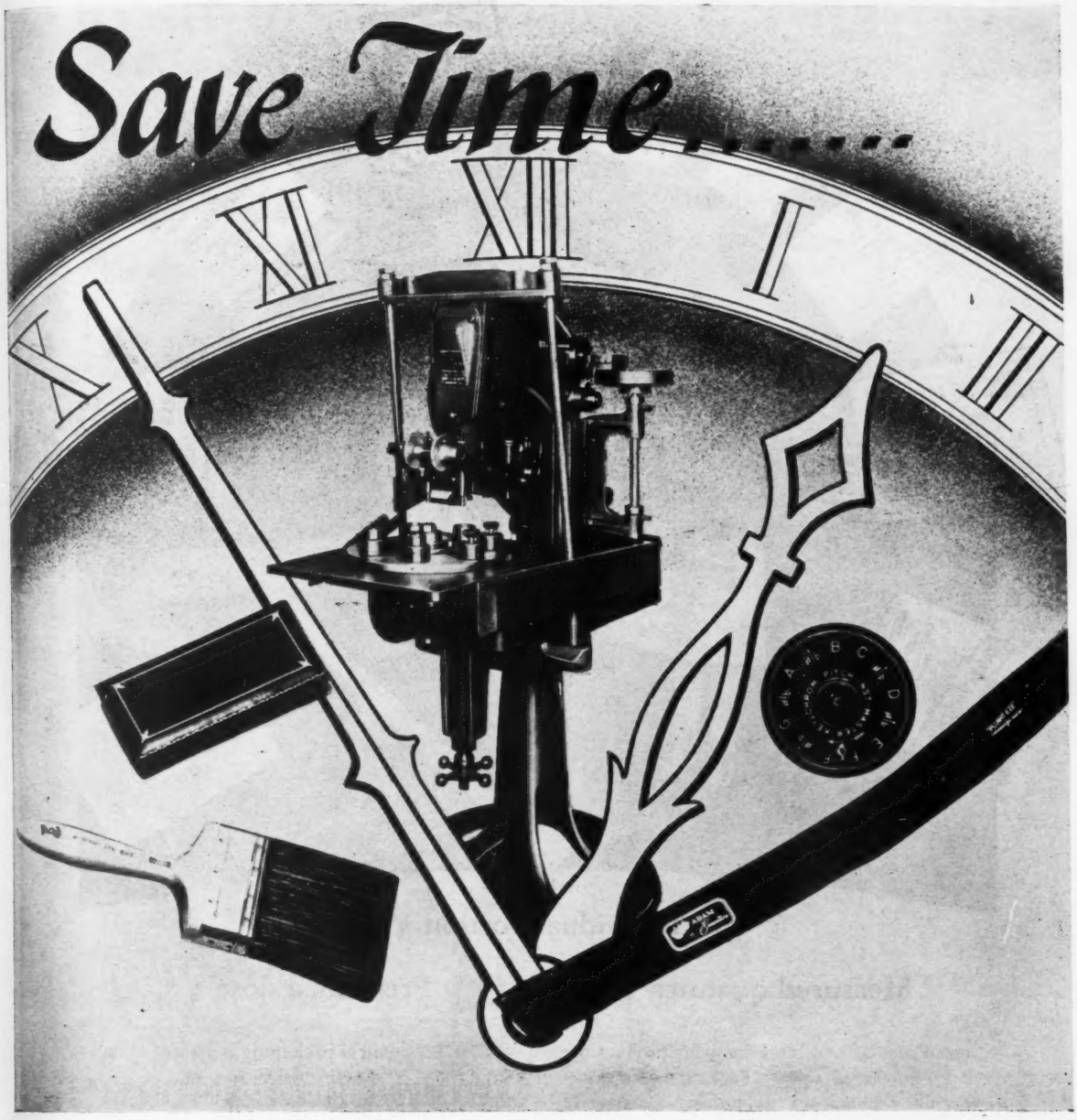
Model 1304 — EXACT WEIGHT "Iron Horse" for heavy duty weighing of pre-determined weight packages. Features rugged construction, short platter fall which eliminates much scale wear, long indicator travel on the dial, speed of operation, protected dashpots to eliminate foreign matter, working parts enclosed, weighing accuracy unaffected by out-of-level floors or machinery vibration. Accurate to 1 ounce over and under weight under full load — Capacity to 150 lbs.



Model 1304

THE EXACT WEIGHT SCALE CO.
223 W. Fifth Ave. Columbus 8, Ohio
Dept. I 1104 Bay St. Toronto, Canada

THERE IS NO SUBSTITUTE FOR EXACT WEIGHT
INDUSTRIAL PRECISION SCALES



IF YOU HAVE TO MARK PRODUCTS

The Peerless Process is an economical method of engraving decorative designs, lettering, numerals, trademarks, etc., into the surface of a product. The process utilizes a stamping press, a heated brass or steel die or type, and a roll of Peerless Marking Foil. Impressions are made at printing speeds . . . in gold, silver, or in pigment colors . . . on such materials as paper, cloth, leather, fibre, wood, plastics . . . on enameled metal surfaces in some cases. By eliminating slow, old-fashioned methods the Peerless Process saves priceless production time and reduces substantially the cost of former engraving methods. Write for further information relating to your products.

PEERLESS ROLL LEAF COMPANY, INC.
4511-4513 New York Ave., UNION CITY, N. J.



Individual portion √

Measured quantity √

mean regular and more frequent product use . . . increased sales. Packets are a time-saving convenience at home. Carried in purse or pocket, packets create supplementary markets.

As a lower priced sales unit, packets lessen both consumer and retailer sales resistance. New users are created. Wider distribution secured. New sales outlets opened.

Packets get preferred display on counters, on cards, in racks; for foods, drugs, medicines, chemicals, cosmetics, toilet preparations . . . anything in powders, granules, crystals.

Prescribed dose √

Fast, economical packaging is assured from

BROWN AUTOMATIC FILLING & SEALING MACHINES

with Brown-made packets designed and printed to specification.

Or, use our Filling Service (our machines at our plant) to test a market or sales territory. We split-ship as directed.

Or, let us determine product adaptability, flow-test, packet content, etc. Send trial quantity of product or material. No obligation. Free report.

Let us help you think, plan, act ahead of post-war competition

THE BROWN BAG FILLING MACHINE COMPANY · FITCHBURG · MASS.

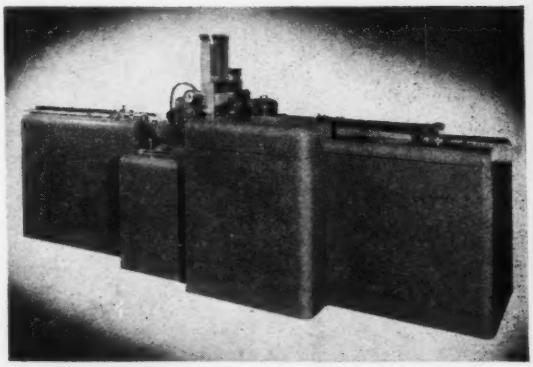
Redington Packaging Machines

have a 47-year record of packaging jobs well done for practically every type of product



CARTONING MACHINES

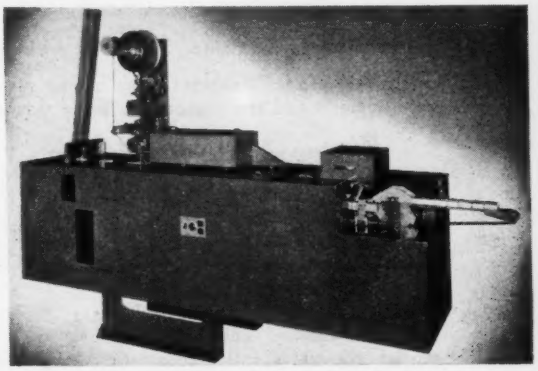
● *Consult Redington* for automatic cartoning of practically any solid item. Machines are available for inserting bottles, jars, collapsible tubes, razor blades, candy coated gum, oleomargarine, macaroni, soap and *almost any other* solid item or container in glued-end or tuck-end cartons. *Redington* Cartoning Machines can be equipped with circular mechanism for automatically handling printed advertising matter—means for code stamping carton—means for printing on cartons—mechanism for other features such as placing a corrugated protector around bottles.



Type 23 Continuous Loading Cartoning Machine for handling Fitch's Ideal Hair Tonic. Same type machine built for items shown at the left, as well as for many other products.

WRAPPING and CELLOPHANE WRAPPING

● *Consult Redington* for high speed wrapping machines for handling products in Cellophane, Sylphrap, wax or glassine paper and *other wrapping materials.* Redington Wrapping Machines can be equipped with mechanism for applying "Easy Opening Tape"—with photoelectric cell mechanism for controlling cut-off of printed design—with special mechanism for handling government stamps for tobacco packages, and with many other special mechanisms.



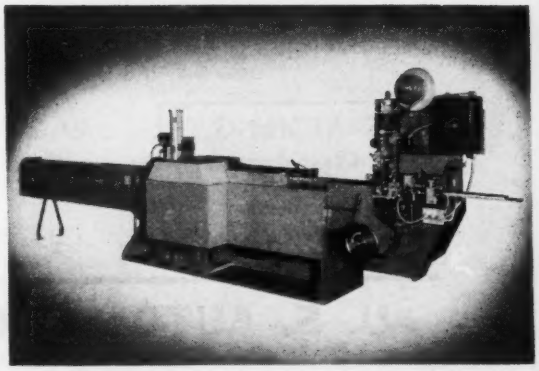
Type 96 high speed Cellophane Wrapping Machine with means for applying Easy Opening Tape. Machine shown was built for wrapping cigarette packages. Available for high speed wrapping of similar items.

Combination CARTONING and WRAPPING

● *Consult Redington* for machines for such items as the new Schick Injector package, candy coated gum and other packages where it is advisable to carton and wrap on the *same* machine. Photoelectric cell mechanism for registering printed wrapping material, and easy opening tape mechanism are available.

SPECIAL PACKAGING

● *Consult Redington* for packaging machines that defy classification . . . the unique wrap of Listerine, the double wrap for Crystal White Soap, the interlocking wrap for tins of Underwood's Deviled Ham, the Phillips Milk of Magnesia package, Bayer's tins of Aspirin, Life Savers, professional and sample envelopes for Bayer's Aspirin and Grove's Laxative Bromo Quinine.

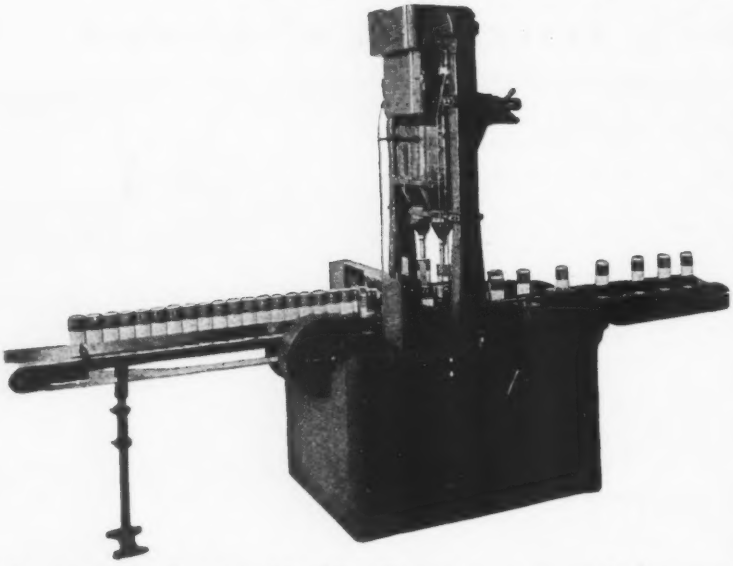


Type 23 Continuous Loading Cartoning Machine combined with Cellophane Wrapping attachment. This combination unit not only inserts article into carton but also wraps closed carton in Cellophane.

F. B. REDINGTON CO. (Established in 1897) 108 So. Sangamon St., CHICAGO, ILL.

U. S. Automatic Equipment

FOR PROVEN VERSATILE PERFORMANCE



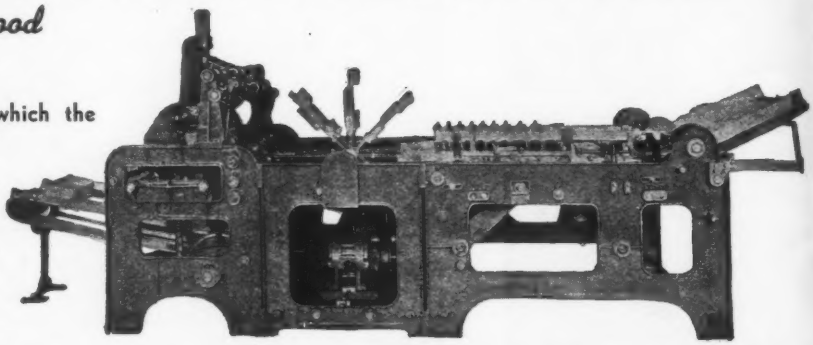
Model JK Automatic Gross Weigher and Packer

Out of our wide line of weighing and filling machines we show one of our latest models. This machine can be equipped to volume fill or gross weigh powdered, granular and paste materials, but its most outstanding feature is its ability to pack *automatically*. This is highly important nowadays when many containers must be decreased in size under the Food and Drug Laws, thus making it difficult if not impossible to get the required quantity into the container without packing.

The Model JK incorporates many improvements, only a few of which we can list here: Hand control for quick adjusting of weight variation resulting from a change in the density of the product. By the simple turn of a knob this variation can be corrected while the machine is running.—Automatic No Container, No Fill.—Change gears to provide the most efficient auger speeds for different products.

These late model machines carry on the reputation for versatile and reliable performance established by the Bond line of automatic and semi-automatic filling machines which have been used throughout the country for many years.

Universal Brightwood Box Machine



Another line of equipment for which the U. S. Automatic name is famous is the "Brightwood" paper box making machines, both Standard and Universal. The Universal model shown is fully automatic and versatile in the wide range of different sizes and styles of boxes it makes. Primarily designed to produce high grade boxes with turned-over ends from double side-wall blanks (such as used for shoes, candy, hosiery, etc.), it also is an efficient high speed machine for producing the regular single wall boxes (except hinge cover) that have been made for years on Standard Brightwood machines.

Other types of machines in our line are not shown here. We solicit your inquiries on machines for:

CARTONING
Cough drops
Candies
Razor Blades
Soap and other solid items

PACKAGE FORMING AND FILLING
CARTON MAKING
CARTON SEALING
LINING and WRAPPING

NET AND GROSS WEIGHING
All dry products, free - flowing and non - free - flowing

U. S. AUTOMATIC BOX MACHINERY CO., INC.

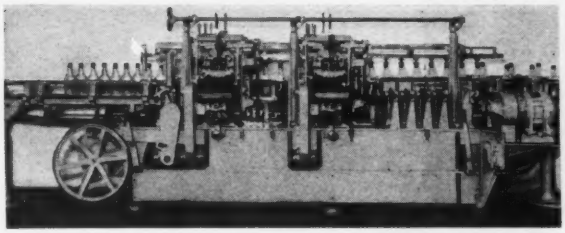
(Divisions: National Packaging Machinery Co. and Cartoning Machinery Corporation)

18 Arboretum Road, Roslindale 31, Boston, Mass.
Branch Offices: New York, Cleveland, Chicago
LOS ANGELES—Krugh Equipment & Supply Co.,

XUM

WORLD LABELERS

Whether your labeling job involves ink or iodine, catsup or cosmetics, beverages or blackberry jam — whether it calls for continuous mass production, limited output, frequent changes of container or label sizes and shapes, application of front labels, back labels, neck labels, tall or any combination of them, you will find the most efficient, economical labeling in the WORLD. WORLD Labelers are the product of the world's oldest and largest manufacturers specializing in labeler engineering and production exclusively.

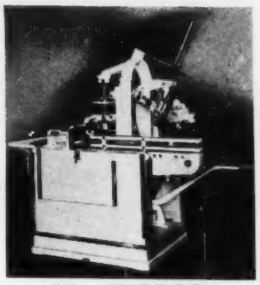


The WORLD Automatic BEE-LINE Straightaway Labeler is for clean, firm, precise application of front or front and back body labels — and neck labels simultaneously if desired — to round, square, oval, flat or panel containers. It conducts them swiftly, continuously and gently through the entire operation in a bee-line, without stops, detours, collisions, jars or jams. It is ideal for the modern light weight glass.

The Model HG BEE-LINE does equally fine work on production labeling of gallon and half gallon jugs and bottles.

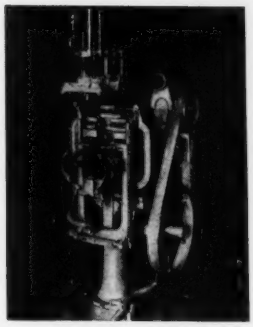
The WORLD BEE-LINE Model HS High-Production Straightaway Labeler (pictured above) is equipped with twin labeling stations to handle two bottles simultaneously while maintaining the same efficient labeling speed as the single station BEE-LINE Labeler.

WORLD LABELER HEADQUARTERS
is at all times ready to assist you on all problems of label application, conversion, service or maintenance.

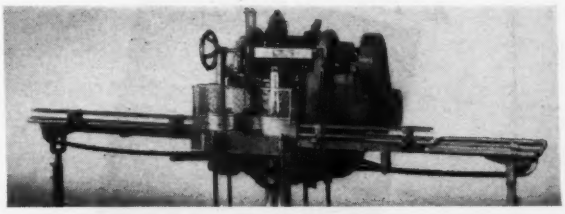


The WORLD Automatic Uni-Turret Labeler
is for superfine labeling of smooth, fluted or fancy containers. It is compact, sturdy, easy-to-operate.

TWIN-TURRET and TRIPLE-TURRET
Labelers are available for high production, continuous operation, quality labeling.



The WORLD Model S Semi-Automatic Labeler
is WORLD'S most versatile labeler. It handles any size container from tiny samples to gallon jugs and any size and shape labels — front and back, body and neck, or those that go all 'round the container.



The WORLD Automatic ROTARY Labeler
is WORLD'S most dependable labeler for economical production labeling of all kinds of round bottles up to 4" diameter. It applies body labels, body and neck labels, or foil, singly or in one operation.

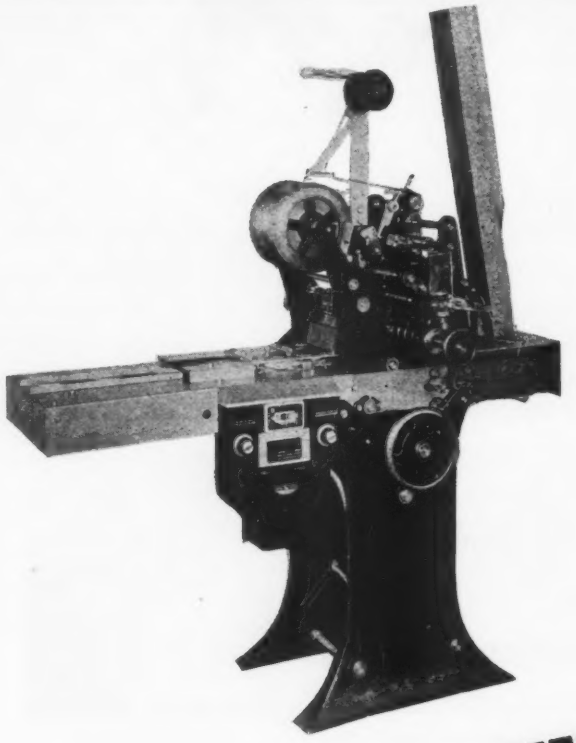
ECONOMIC MACHINERY COMPANY

Builders of World Automatic and Semi-Automatic Labelers for Every Purpose

Worcester, Massachusetts

NEW YORK · PHILADELPHIA · PITTSBURGH · CHICAGO · SAN FRANCISCO · DENVER · LOUISVILLE
SALT LAKE CITY · EL PASO · SEATTLE · PORTLAND · LONDON · MONTREAL · TORONTO · WINNIPEG
SPOKANE · VANCOUVER · SYDNEY, AUSTRALIA · WELLINGTON, N. Z. · SAN JUAN, P. R.

XUM



350 packages per MINUTE!

Tight-wrapped with Cellophane

—— with Freshness SEALED-IN . . .

That means nominally as fast as human hands can feed your packages, the Hi-Speed Fully Automatic Scandia Wrapping Machine will handle products within its size specifications. *With tear-strip attachment if desired!*

ABOVE MODEL: STC-1 **SPEED: 350 per min.**
FLOOR SPACE: 22″ x 55″

DIMENSIONS: Approximately Cigarette Package size. Shown above with TEAR-STRIP attachment.

If YOU Have A "Packaging Problem"

For 26 years we have been instrumental in designing and supplying Special Performance machines to meet and overcome excessive production cost, or achieve stepped-up capacity. Call Scandia—for proof and for discussion.

Ask for details! Our Packaging Engineers are at your service.

Scandia MANUFACTURING CO.

NORTH ARLINGTON NEW JERSEY

The "ANSWER" To Your Packaging Problems— PAPER BODY CANS!

Here Are the Reasons:

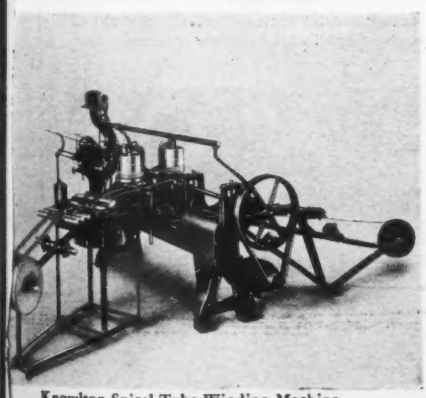
1. Conservation of Critical Materials!
2. Improvement in Package Design!
3. Definite Savings on Production Costs!
4. Greater Durability!
5. Savings in Packing and Shelf Space due to variety of shapes and sizes available!

Knowlton Paper Can Winding Machines are helping thousands of manufacturers solve today's packaging problems. They can do the same for you!





Automatic Convolute Fibre Can Winder



Knowlton Spiral Tube Winding Machine

For "Better Dressed" Packages that Conserve Critical Materials...Choose KNOWLTON PAPER CAN MACHINES

These versatile Automatic Paper Can Machines incorporate a host of special features which are acclaimed as revolutionary by manufacturers and packers alike. The parts these Knowlton Machines are playing in the conservation of critical materials and the solving of packaging problems are mighty important ones, and they perform them in an amazingly simple and economical manner.

The Knowlton Automatic Convolute Winding Machine accepts paper stock from the roll and automatically produces paper can bodies in round, rectangular, or irregular shapes—applies the adhesive, and lithographs labels, and delivers the completed can bodies ready for the seaming-on of either metal or paper tops and bottoms.

This machine is equipped with an automatic slitting and labeling attachment which permits production of from one to five complete can bodies at a time during the winding process. It produces paper can bodies in multiple lengths up to 20″ in height, and with diameters ranging from $1\frac{3}{4}$″ to 9″ for cylindrical and from $1\frac{1}{2}$″ to 9″ across diagonal corners for irregular shaped paper can bodies.

The Knowlton Spiral Tube Winding Machine is another example of modern efficiency. It is the fastest and most economical machine for winding paper tubes or cores ranging from two to twenty-one plies and its product is unsurpassed for tube strength, accuracy and high quality. It is the natural choice for the making of food containers, cosmetic boxes, tissue cores, heavy mill cores, mailing tubes, dry battery cores, spools, etc.

For more complete information as to how Knowlton can help you solve your packaging problems, write or call our nearest office.

M. D. KNOWLTON CO., ROCHESTER, N. Y.

BOSTON
Massachusetts Ave.

NEW YORK
203 Wooster St.

Pacific Coast Representatives
H. W. BRINTNALL CO.
Los Angeles, San Francisco, Seattle

CHICAGO
9 S. Clinton St.

TORONTO, CAN.
260 Richmond St., W.

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TOLEDO SCALES

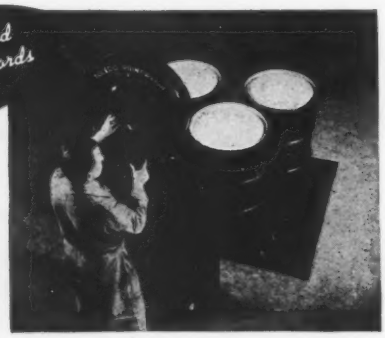
1025 TELEGRAPH ROAD • TOLEDO, OHIO

CANADIAN TOLEDO SCALE CO. LIMITED, TORONTO, ONT.

SALES AND SERVICE IN 181 CITIES, U.S.A. AND CANADA

For greater Accuracy...for greater Speed ...for greater Dependability in weighing —Look to Toledo! There's a Toledo to meet your Exact Needs. Helpful literature on equipment shown will be supplied upon request. Complete engineering service.

For Printed Weight Records



• Printed weight figures eliminate human errors, guard accuracy of vital weight records. Toledo Printweigh Scales available in a range of sizes and capacities. Prints on tickets or paper tape; multiple copies. Easy to operate.

For Accurate Ingredient Weighing



• Ingredients carefully proportioned by weight assure product uniformity and highest quality. Toledo Scales weigh ingredients accurately, quickly. Models for every type of weighing, from heavy-duty to extremely sensitive scales

For Speedy and Accurate Packaging



• Speedweigh scales in both center or end-tower models have full range of commodity equipment. Large ounce graduation, with easy-to-read chart for highest accuracy in packaging, checking operations. No need to level scale. In-built carrying handle.

For Electric Cut-off Automatic Weighing



• Where entirely automatic operation is desired, Toledo Electric Cut-Off Scales, using either photo-electric or mercury magnetic cut-offs, are available. Scale automatically dumps correct weight of material being packaged. Rapid and highly accurate.

For Bagging and Filling Operations



• Accurate filling of heavier bags and containers is rapidly accomplished with Toledo Over-and-Under Dial Scales. Wide indicator travel provides close accuracy in trimming filled packages. Available in either portable floor or bench style scale.

For Receiving and General Weighing



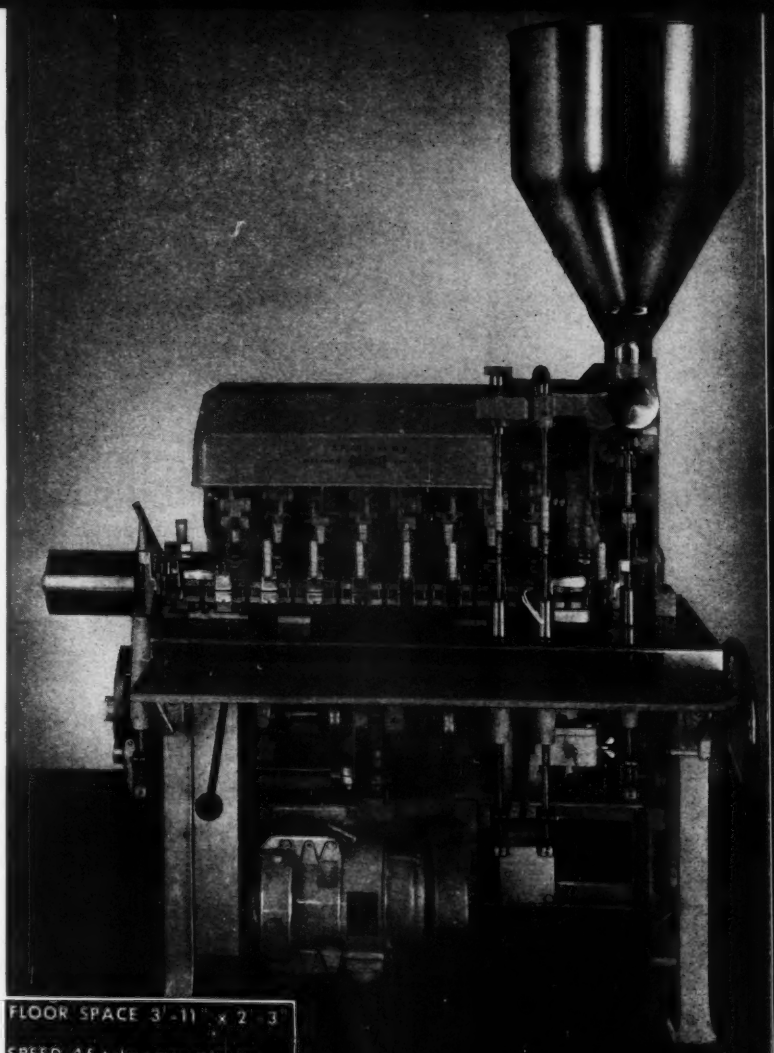
• Toledo "1500" floor scales are ruggedly built for receiving, shipping and general heavy weighing. Highly accurate. May be equipped with Toledo Printweigh for indisputable printed weight records in either tape or ticket form, or combination of both.

THE ARENCO TUBE FILLER

Fills, closes and seals collapsible tubes . . . interchangeable to handle pastes, creams, lotions and liquids . . .

FEATURES . . .

- Automatic cap tightening.
- Automatic tube cleaning before filling.
- Positively correct quantity in each tube.
- Clean filling—no spattering of inside closure wall—no material trapped in folds.
- No tube, no fill—no material delivered from filling nozzle if tube is missing.
- Ample passage for material—no valves or longtube connections. No squeezing to change consistency or viscosity of material.
- Quick cleaning when changing from one material to another.
- Quick changing from one tube size to another.
- All parts of machine easily accessible for control, lubrication, and cleaning.
- Stainless steel or other non-corrosive metals are used in all parts contacting the material.



FLOOR SPACE 3'-11" x 2'-3"
SPEED 45 tubes per minute
ONE OPERATOR

TYPES OF ARENCO CLOSURES



WHEN THE WAR ENDS

All Arenco facilities are devoted to War Work but we are prepared to meet post war needs quickly, and invite inquiries to meet your normal requirements for Post War Deliveries.

MACHINE COMPANY
INCORPORATED
ARENCO
NEW YORK, N. Y.

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WHEEL TRACTOR CRANES

FORK LIFT TRUCKS

HOISTING UNITS

LIVE SKIDS

DUMP CARTS

HAND LIFT TRUCKS
HYDRAULIC

STACKING ELEVATORS

PLATFORM ELEVATORS

PORTABLE CONVEYORS

TRAILER TRUCKS, ALL TYPES

TRUCK WHEELS & CASTERS



"THE NAME THAT CARRIES WEIGHT"

MATERIALS HANDLING EQUIPMENT

● In practically every industry you will find Mercer Handling Equipment on the job of speeding up the movement of materials. Our experienced engineering and designing departments have a reputation for licking tough materials handling problems — they'll back you up — like your job, theirs, too, is to "keep 'em moving" . . . So, don't hesitate — Call on Mercer for a lift!

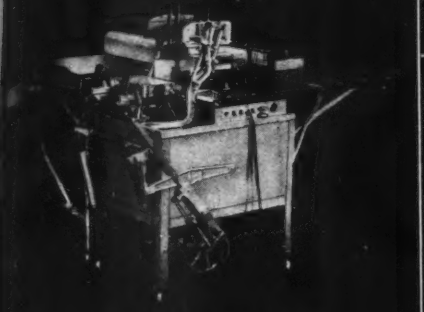
MERCER ENGINEERING WORKS, INC.
WORKS: CLIFTON (ALLWOOD) N. J.

REPRESENTED BY

MERCER-ROBINSON COMPANY, INC.
30 CHURCH STREET, NEW YORK 7, N. Y.

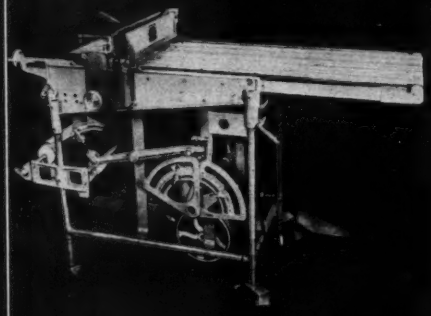
Machines for...

WRAPPING



MILLER MODEL MPS
WRAPPING MACHINE

SHEETING-GLUING



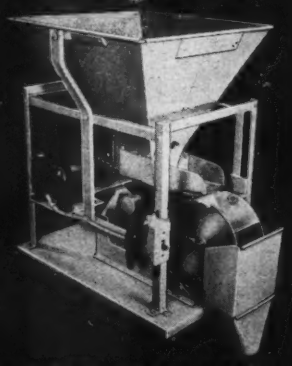
CORLEY-MILLER "SPEED-WRAP"
PAPER SHEETING AND GLUING MACHINE

BAG MAKING



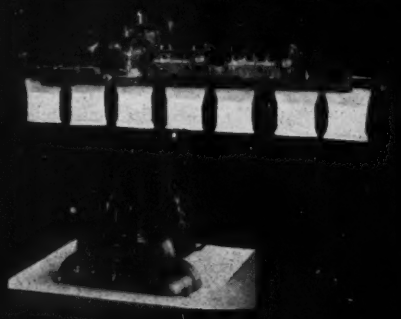
SIMPLEX HIGH SPEED AUTO-
MATIC BAG MAKING MACHINE

FILLING



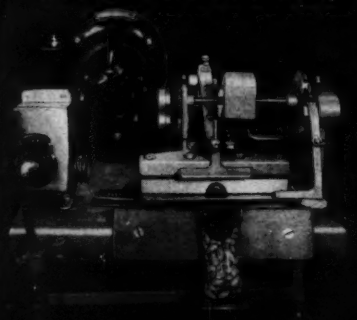
HOLM MODEL A-AH WEIGHING
AND FILLING MACHINE

ROTARY SEALING



AMSCO HIGH SPEED ROTARY
BAG SEALING MACHINE

JAW SEALING



SEALTIGHT MODEL 28 JAW
TYPE BAG SEALING MACHINE

Miller offers machines that bring new efficiency and economy to packaging operations . . . dependable, speedy equipment for: 1. Wrapping, 2. Sheeting and Gluing, 3. Bag Making, 4. Bag and Carton Weighing and Filling, 5. Rotary Bag Sealing or Crimping, 6. Jaw action Bag Sealing or Crimping, 7. Sandwich Making and Wrapping. Also hand and foot operated heat sealing Crimpers, Hot Plates, and Hand Sealing Irons. Send for literature or ask for the assistance of our packaging engineers on specific problems.

Miller *Wrapping & Sealing Machine Co.*

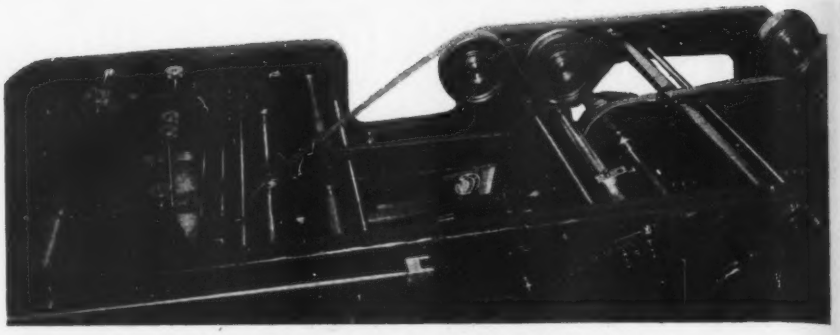
18 SOUTH CLINTON ST., CHICAGO 6, ILLINOIS

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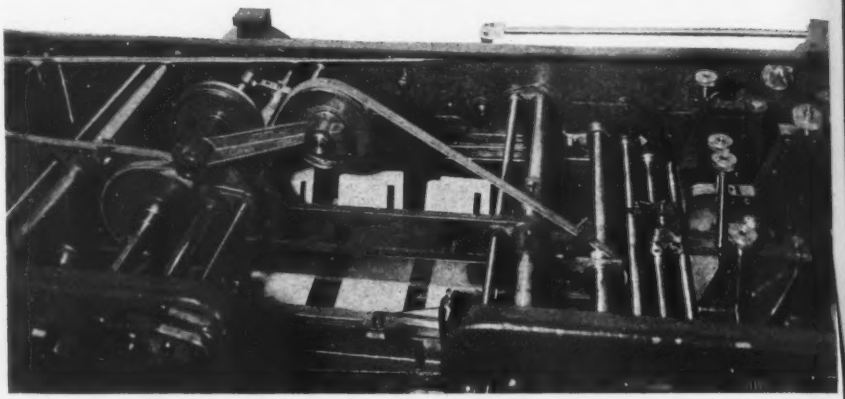
The trend of the times

PREFOLDED folding boxes are now a necessity, especially in small and intermediate sizes. New high speed filling machines operate more efficiently and at higher speeds when the folding box is crease broken. When crease broken folding boxes are filled by hand, production is increased tremendously.

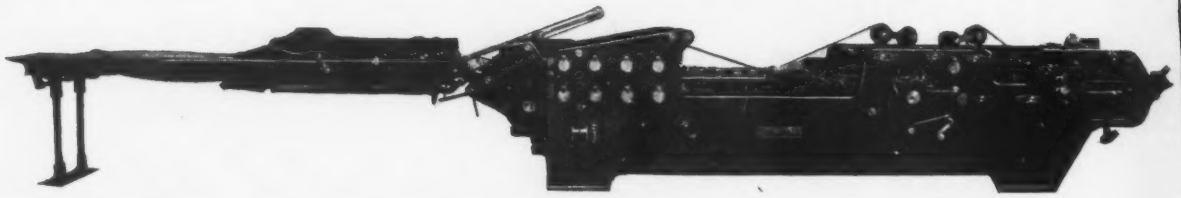
THE MODEL 6F MEETS THE TREND OF THE TIMES FOR MAKING CREASE BROKEN FOLDING BOXES



Crease Breaking Section, Model 6F—Right Hand Side



Crease Breaking Section, Model 6F—Left Hand Side



THE MODEL 6F IS THE ONLY FOLDING BOX GLUER ON THE MARKET THAT—

GIVES ABSOLUTE BELT CONTROL TO THE BLANK FROM THE TIME IT LEAVES THE FEED UNTIL IT IS DELIVERED INTO THE STACKER. THERE ARE NO GAPS TO JUMP FROM THE PREFOLD TO THE FOLD SECTION, OR FROM THE FOLD TO THE DELIVERY SECTION.

EMBODIES OVER 800 HIGH GRADE BALL BEARINGS SO THAT THE MACHINE CAN BE RUN AT HIGH SPEEDS WITH A MINIMUM OF VIBRATION AND NOISE.

No, not magic — just scientifically designed — common sense tried and proven mechanisms developed through years of experience.

THE INTERNATIONAL PAPER BOX MACHINE COMPANY
315 MAIN STREET NASHUA, NEW HAMPSHIRE

"Since 1903 BETTER BOXMAKING MACHINERY"

HERE ARE 9 GOOD REASONS *why*

YOU SHOULD BUY A HAYSSEN HIGH-SPEED WRAPPING MACHINE

1 **Perfect wrapper registration by photo electric eye**

2 **Low capital investment**

3 **Electric heat sealing—using Cellophane or waxed paper**

4 **Adjustable to wide range of package sizes**

5 **One operator, or can be connected to line conveyor**

6 **Sturdily constructed for longevity and low upkeep cost**

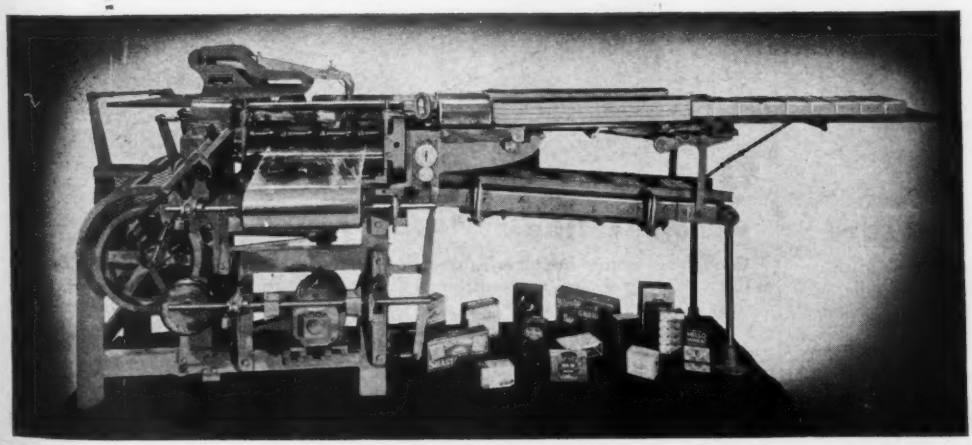
7 **Mechanically simple**

8 **Variable speed adjustment**

9 **Thermostatic heat control**

We have been building wrapping machines for over 30 years and every one carries the full fruit of our experience in low cost, low upkeep, high production.

HAYSSEN MFG. CO. SHEBOYGAN, WISCONSIN



COMPLETE PACKAGING SERVICE

with Battle Creek Machines

Illustrated below are seven basic steps demonstrating the complete coördinated packaging service performed by Battle Creek Packaging Machines. There are separate machines for each individual operation illustrated; or complete coördinated units to perform all seven operations in the sequence shown. The completeness of the Battle Creek line, made up of machines designed to operate together smoothly and efficiently as a team, assures trouble-free performance of each operation, from start to finish.



1. Carton Feeder

Automatically feeds out carton blank, applies glue to side seam and bottom flaps, forms and seals carton around continuously moving mandrel at speeds of 75 to 90 per minute.



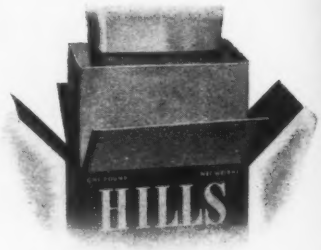
2. Bottom Sealer

Automatically applies glue, folds flaps and seals bottom of carton under 3 tons pressure for sift proof seals. Three models — 30, 60, and 90 per minute.



3. Liner

A built-in liner attachment is available on the carton feeder and bottom sealer to form and seal bags within the carton from glassine, waxed paper or cellophane. Speeds up to 90 per minute.



4. Filling

Three models are available (volume fillers, net weight or gross weight scales) to fill dry products in cartons at speeds up to 90 per minute.



5. Triple Roll Closure

The patented Triple Roll Closure machine creates an airtight package within the carton, all at speeds up to 90 per minute. Ideal for hygroscopic products.



6. Top Sealing

Continuous motion machines to create tightly sealed packages are available in three models — 30, 60 and 90 per minute—all furnished with pressure dryers for maximum sealing results.



7. Wrapping

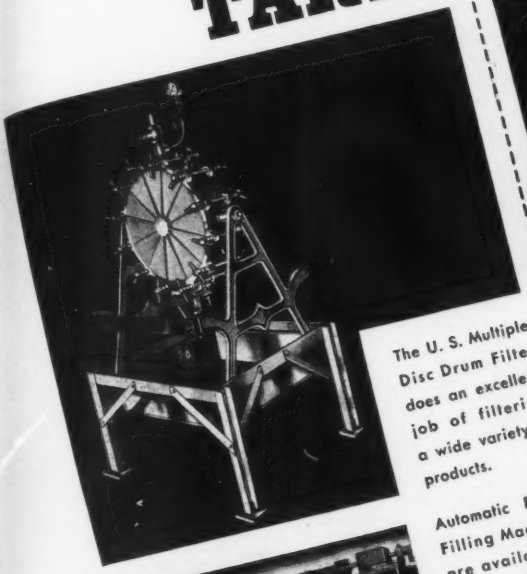
Many models available to wrap packages ranging from a cough drop size to a 2 pound cracker size. Speeds range from 30 to 120 per minute, and any self-sealing material may be handled.

BATTLE CREEK BREAD WRAPPING MACHINE COMPANY, Battle Creek, Michigan

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TAKE A PEEK...





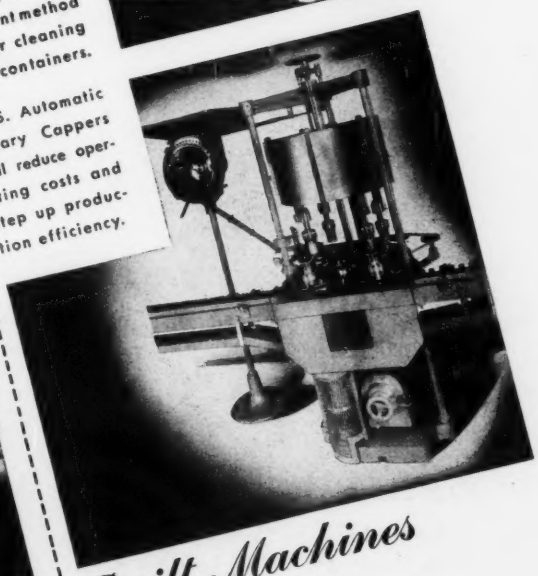
The U. S. Multiple Disc Drum Filter does an excellent job of filtering a wide variety of products.

The Sanitair Rotary Automatic Air Cleaner, the most efficient method for air cleaning new containers.

Automatic Rotary Filling Machines are available in many different styles, constructions and sizes.

U. S. Automatic Rotary Cappers will reduce operating costs and step up production efficiency.





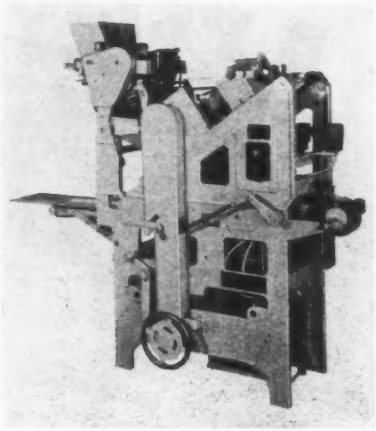
at these Custom Built Machines

U. S. BOTTLERS
Machinery Co.
4032 N. ROCKWELL ST., CHICAGO

MANUFACTURERS OF
PUMPS
CAPPERS
FILTERS
CONVEYORS
WASHERS & DRYERS
WASHERS
CORKERS
FILLERS

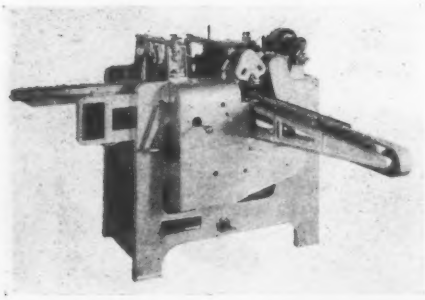
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POST-WAR EQUIPMENT



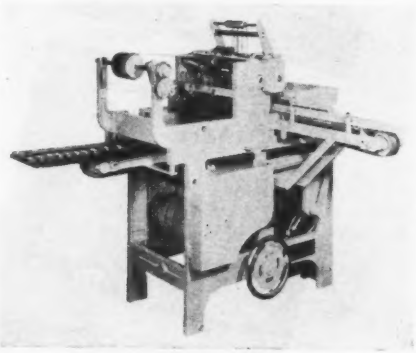
BAG MACHINE

30 per minute



WRAPPING MACHINE

Single Head—75–90 per min.
Double Head—150–180 per min.



WRAPPING MACHINE

30 per minute

ALSO

SPECIAL PACKAGING EQUIPMENT

RICHARD MACHINE COMPANY

BATTLE CREEK, MICHIGAN



PACKING FOR SHIPMENT

Standard Shipping Practices 600

Corrugated and Fibre Shipping Boxes 605

Steel Barrels and Drums 609

Linings for Metal Containers 613

Fibre Drums 616

Linings for Fibre Drums 620

Wood Barrels and Drums 623

Wood Boxes 624

Carboys 626

Prepacking 627

Steel and Fibre Strapping 629

Types of Gummed Tape 633

Tape for Waterproof Containers 634

Equipment for Applying Tape 635

Protective Pads and Cushions 639

Flexible Corrugated for Protection 641

Shipment of Freight by Air 643

Packing for Export 647

Standard shipping practices

Although the war has speeded up the movement of freight and brought some necessary changes in shipping practice, traffic regulations remain basically the same. Some of the changes represent advances which may well be permanent gains, while others are temporary expedients to meet current conditions.

One gain which will doubtless remain is the development of a more successful weatherproof box, on which progress has been evident since it was first announced. Aside from the service which this box is performing for the war effort, this outstanding development is of great interest to the fibre shipping-container industry which looks forward to the use of boxes of this kind for service in post-war days in the packing, handling and distribution of many perishable foods. This will include fresh fruits and vegetables which were not, to any extent, shipped in fibre boxes in the past because no fibre container was readily available that would stand up under cold storage, refrigeration, high relative humidity and the other marketing conditions met with in this trade.

One interesting new development in the shipping of metal parts and equipment is referred to as "Method II" and is covered by Army-Navy Aeronautical Specification AN-P-13. The method was worked out coöperatively as a result of the efforts of Army and Navy engineers in conjunction with commercial concerns who supply and fabricate the materials. Briefly, it involves the use of an envelope or sack made of transparent moistureproof film inside of which are placed several containers of the highly hygroscopic substance, silica gel. This method permits machine parts to be put into immediate use on arrival at the point where they are needed, saving the time formerly spent in cleaning off the protective grease.

An example of temporary change is one caused by the critical shortage of paperboard. This resulted, as early as 1941, in pressure being brought to bear on the Assn. of American Railroads to relax the specification requirements for fibre boxes as published by the carriers.

This pressure resulted in the action which was taken by the Consolidated Classification Committee in relaxing the specifications for fibre boxes as published in what is known as Rule 41 of the Consolidated Freight Classification. Effective November 15, 1941, the caliper and bursting strength of fibreboard were reduced below the former minimum standards. While recognized as an emergency measure and so indicated by the Consolidated Classification Committee in fixing an expiration date of one year from November 15, 1941, conditions have made it necessary for the Classification Committee to extend the life of the relaxed regulations to August 15, 1943. This action has been taken notwithstanding the knowledge on the part of the transportation companies that packages of all kinds are now being subjected to greater strain, because of heavier loading of merchandise cars as required by orders of the Office of Defense Transportation, and also notwithstanding the fact that the freight claim account of the railways has shown a steady increase since the middle of 1941 and which has continued to the present time. While the relaxation of the regulations for fibre boxes is not wholly responsible for increased damage claims—one contributing factor, probably, being the loss by railroads of experienced men to the armed services—nevertheless it is felt the relaxed regulations have contributed to some extent to unsatisfactory conditions.

In connection with this subject of relaxed regulations, it should be mentioned that following the Freight Classification publication November 15, 1941, similar reductions were made in the specifications contained in the publications of the Federal Specification Board, Washington, D. C., which are known as Emergency Alternate Specifications which were made effective in May 1942. These Federal Specifications are basic requirements of several governmental departments and are used to some extent as governing specifications for boxes for the shipment of articles purchased by the Government.

Efficient packing and packaging necessary

Obviously, there is danger in introducing into the general shipping field any container which is not of sufficient strength to make a safe and serviceable package or one which may not deliver its contents in good condition at final destination, particularly in these times when waste must be prevented at all reasonable cost and effort. Shippers must also consider the fact that conservation of transportation facilities necessitates the heavier loading of merchandise cars, with a resultant greater strain upon shipping containers and packages of every description.

Wartime shipping and transportation conditions not only require better outside shipping cases, but also adequate interior packing and cushioning to protect the goods within the container. The matter of sufficient good packing is of paramount importance in connection with the shipping of fragile articles. Each presents an individual problem. If a shipper's experience shows undue damage in the transportation of his product, he should investigate. He will find that in most instances the trouble can be rectified through the use of more, or perhaps stronger, packing, and that any added expense will be justified in order to provide a safe shipping package for the protection of his goods in wartime.

Standard practices

The preceding paragraphs review changes in shipping practice which the war has brought. For the most part, however, the standard practices remain in force, and the following serves to summarize them, at the same time directing the reader to sources where more detailed information may be obtained. Many of the subjects are

also treated at greater length in this edition of the PACKAGING CATALOG.

Shipping agencies in the United States include rail (freight, express, baggage and parcel post), trucks, ships and airplanes. While airplane shipments of freight are new and very small proportionately, the end of the war will undoubtedly leave thousands of planes looking for new uses and scores of plane factories looking for new outlets. One logical peacetime outlet is air freight and we are destined to see great progress here.

Today, however, the great bulk of merchandise travels by rail freight and the following considerations are, therefore, directed chiefly to this method, remembering that trucks and, to a lesser extent, other methods of transportation follow similar general principles. Our interest here, therefore, is in freight and particularly in the methods of packaging merchandise for LCL freight since many C/L shipments are bulk while most LCL shipments are packaged.

Official container regulations

To play any game properly, it is first necessary to know the rules. These rules on shipping methods are quite complicated in the aggregate, but become simpler when properly broken down. Although we can touch only the high points here, it is well to consider the most important ones, which are:

Consolidated Freight Classification Rules 5, 40, 41.
Motor Truck Classification (interstate and common carriers).
Official Express Classification Rule 18.
Bureau of Explosives—dangerous articles by freight, express, baggage, motor vehicle (highway), steamship and water (ships).
Parcel Post.
Freight Container Bureau (perishables such as fruits and vegetables).
U. S. Government Federal Standards (there are several hundreds of these).
U. S. Treasury Department Regulation No. 6 covering bottled-in-bond spirits.
There are no uniform specifications for trans-ocean shipments.
There are no official airline specifications.

Freight

The freight regulations are fairly complicated at first glance. Thus, it is first necessary to look up your product under the commodity rate tariff of your individual railroad association (for instance, the New England Freight Association). This is assuming that the shipment would move at commodity rates. However, if it moves under exceptions to the classifications, it is necessary to refer to the "Exceptions to Classification" published by the associations. If it moves under the classification ratings, it is then necessary to refer to the Consolidated Freight Classification. In other words, commodity rates take precedence over the exceptions and the exceptions, in turn, take precedence over the classification. The above is necessarily a very brief and general description of one of the most complicated traffic subjects.

Actually the Consolidated Freight Classification is the reference in most use as this large volume lists each commodity giving in most instances the form of container to be used. These containers in turn are described in detail in Rules 40 and 41 at the end of the book and also under the special container descriptions printed on the blue colored pages near the end of the book.

The Consolidated Classification book may be consulted at 143 Liberty Street, New York, or it may be secured by subscription from the Consolidated Classification Com-

FIBREBOARD BOXES IN COMMON USE

Maximum weight of box and contents (lb.)	*Maximum inside dimensions—length, width and depth added (in.)*	*Solid fibreboard*		*Double-faced corrugated fibreboard, see notes 2 and 3**		
				Facings		
		Minimum thickness of board (in.)	*Minimum test per sq. in. (lb.)*	*Minimum thickness (in.)*	*Minimum test per sq. in. (lb.)*	*Minimum test per sq. in. of combined board (lb.)*
ALL FIBRE BOXES NOT OTHERWISE PROVIDED FOR BELOW, SEE SECTION 4*						
20	40	.045	125	.009	...	125
40	60	.060	175	.016	85	175
65	65	.080	200	.016	100	200
90	70	.100	275	.030	135	275
TWO COMPLETE DOUBLE-FACED CORRUGATED BOXES, ONE FITTING CLOSELY INSIDE THE OTHER, SEE SECTION 4*						
90	70	...	...	.016	85	(Each Box) 175
DOUBLE-WALL CORRUGATED BOXES, SEE SECTION 4*						
65	65	...	...	2 Outer .016 1 Center Liner .016	†85	200
90	70					275
120	100	...	...	2 Outer .030 1 Center Liner .016	200 100	500
140	115	...	...	3 Liners .030	200	600

* References are to Consolidated Freight Classification.
† No test required for center liner for 65-lb. box.

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mittee, Union Station, Chicago. The subscription rate is $2.50 per annum and includes all supplements.

Perishables

In July 1935, the Freight Container Bureau of the Association of American Railroads, 30 Vesey Street, New York City, was given full jurisdiction over all containers used for packing fresh fruits and vegetables, and the methods of loading these containers in freight cars. The Bureau prepares its own container specifications and loading rules tariffs, which are published for the Bureau by J. J. Quinn, Agent, Union Station, Chicago, Ill. The country is divided into four sections, each covered by a tariff; and copies of these tariffs can be obtained from Mr. Quinn. The Bureau also issues its own dockets and holds public hearings three times a year.

Through the medium of a Test Rule, permits for which are under the jurisdiction of the Bureau, a ready means is provided shippers and container manufacturers to try out promising new containers, or developments in old containers, in actual shipments.

Test shipments

The carriers recognize that constant experimentation is the road to improved containers and reduced damage claims. For that reason, they are very lenient and coöperative in regard to legitimate test shipments of new containers. Sometimes these can be arranged for by conferring with the carrier involved while the Freight Container Bureau and the Freight Classification Committee have definite procedures for carrying out such test shipments. In respect to freight, this procedure is described in detail in Rule 49 which has recently been added to the Consolidated Classification.

Express

Shipments in fibre boxes by express must comply with the regulations of the Official Express Classification and particularly with Rule 18 of that classification. This pamphlet may be secured by application to the Railway Express Agency, Inc., 230 Park Ave., New York. The subscription is free on application and supplements are issued from time to time although only two supplements are in effect at any one time. Changes are less frequent than in the Freight Classification and are often arranged informally without regular docket hearings. Rule 18 follows the freight Rule 41 very closely but in a more abbreviated form. The principal differences are that on packages weighing 35 lbs. or less a non-conforming box will be accepted unless such package exceeds 50 united in., in which case they must also be crated or "securely wrapped" for acceptance. There are certain exceptions to this rule and these are listed in the Freight Classification.

The other important difference is the fact that all regular express boxes will be accepted up to 90 united in. and the gross weights vary with the strength of the board. Some merchandise will not be accepted by express in fibre containers. This includes mirrors (value at over $2.00), statuary and other miscellaneous items.

Bureau of explosives

The shipment of all dangerous articles comes under the control of the Bureau of Explosives, 30 Vesey Street, New York, and their published regulations take precedence over the standard freight, express and other requirements. These regulations apply on all methods of transportation and a copy may be secured on application. The transportation of explosives and dangerous articles is covered by an Act of Congress, which Act authorizes the Interstate Commerce Commission to utilize the services of the Bureau of Explosives in carrying out and enforcing the provisions of the Act.

These Bureau of Explosives regulations cover inflammable materials, explosives, fireworks, poisons and other dangerous articles. In many cases special requirements must be complied with when packing this type of merchandise, such as the use of labels and special marking. Because of the dangerous nature of this merchandise, the Bureau has to impose stricter requirements than in the case of ordinary freight and has to be very efficient in policing and enforcing these rules. As a result the transportation systems of this country have an enviable reputation for the safe handling of explosives and other dangerous articles running back over a period of years.

Canadian requirements

While Canadian regulations are not as voluminous nor as detailed as those in the United States, they follow, in general, the American specifications very closely. This is especially true for freight.

Parcel post

The Post Office Department does not issue detailed packing specifications, although they do maintain a "Classification Department" at the New York City General Post Office. Rules may be studied by consulting the Postal Regulations or specific pamphlets available at all post offices. In case of doubt, submit your proposed package to your local postmaster. Parcel post packages must not exceed 70 lbs. in weight nor 100 in. in length and girth combined which is equivalent to "height plus waist measure."

U. S. Government specifications

Until recently each branch of the Federal Government maintained an independent set of container specifications. This confusion was largely eliminated a few years ago by the establishment of the "Federal Specifications." However, the Army, Navy, Marine Corps and others still keep many of their own specifications in force. For instance, the Army publishes an "Index" of specifications covering 250 pages and listing about 6,000 individual items. All of these listings carry a coded number such as WW-P-377 which, in turn, refers to a separate pamphlet procurable from the Superintendent of Documents at a cost usually of 5 cents and this pamphlet, under paragraphs G and H, describes the form of shipping container to be used for that particular commodity. Thus, the recipient of a contract for spaghetti, for instance, finds in

the Index that this is specification No. N-M-51. He then has to secure this pamphlet which describes in detail just how the spaghetti must be made and paragraphs G and H tell him how it must be packaged and shipped. In some cases these container requirements are specific while in other instances they simply state "commercial containers may be used." In other instances, the reference may be to the general Federal container specifications, some of which are as follows:

Specification LLL-B-631a—corrugated containers.
Specification LLL-B-636a—solid fibre containers.
Specification NN-B-601—cleated plywood boxes.
Specification NN-B-621—nailed and lock corner wooden boxes.
Specification NN-B-631—wire-bound wooden boxes.

The Treasury Department also has some specifications of its own. One of these is known as "Regulation No. 6" and covers all containers for the shipment of bottled-in-bond spirits, takes precedence over other regulations.

Motor trucks

This form of transportation has now become so popular that there are several classification books available, the principal one being the "National Motor Freight Classification" published at 1013 Sixteenth Street, Washington, D. C. This also lists the various commodities and states how they should be packed, for instance "bags, boxes, barrels," etc., but does not require that these containers conform to any detailed specification. A movement is now under way to bring these containers into line with the present freight specifications.

Fibre containers

Inasmuch as fibre containers are still relatively new in comparison with wooden boxes, it is necessary to comply with certain legal regulations when using these containers for shipment. The principal regulations are:

Rail freight—The regulations for freight shipment of merchandise in fibre containers are promulgated by the Consolidated Freight Classification representing about 950 participating railroads and coastwise steamship lines. The services of an expert traffic man are required to decide whether a given product comes under the commodity rate tariff of an individual railroad association, under exceptions to the Classification or under the Classification ratings themselves. In the latter event, the requirements are uniform for all carriers and the detailed specifications covering the use of fibre containers are contained in Rules 5 and 41 of the "Consolidated Freight Classification." This is a book of approximately 430 pages, about the size of a telephone directory, and may be secured from the Classification Committee, 202 Union Station, Chicago, Ill. The subscription charge is $2.50 per year which includes all supplements. Every shipping man should subscribe to this service as the book not only contains all rules and regulations covering freight shipments and packing specifications for articles in fibre containers, but also lists the individual commodities together with prescribed methods of packing each.

Rule 5 states that "all containers must be such as to afford reasonable and proper protection to contents" and also defines such words as "packages," "bale," "bundles," "boxes," etc. Rule 41 defines "boxes" of various accepted styles and describes how they should be manufactured, sealed, tested and otherwise made ready for shipment. Inasmuch as each of these words has a very definite meaning, the definitions are shown below.

When the item is specified "in boxes," it means that when corrugated and solid fibre boxes are used, they must conform in all respects to the specifications in Rule 41. This includes many patented or infrequently used boxes and the table from Rule 41 (p. 600A), therefore, shows only the boxes in common use and not the unusual styles. Wartime pressure has been responsible for considerable progress in the development of new types of packaging, particularly in fibreboard containers. Details of most of these developments generally can be ascertained through perusal of the most recent Army-Navy specifications for such containers noted elsewhere in this issue of PACKAGING CATALOG. Note also Army-Navy Specifications for nailed and wire-bound shipping boxes.

The only other definition of "boxes" is found in the furniture classification where a box may measure up to 85 united in. on 200 test and 100 united in. on 275 test.

The words "bales" or "bundles" mean, in reference to corrugated or solid fibre boxes, that the weight and dimension limits may be disregarded provided that if the box is oversize or overweight, it must be "securely bound" with metal straps, wire or ropes. Sometimes bales or bundles are charged a premium of 20 per cent over the "in boxes" freight rate. The details of this ruling are too lengthy to repeat here but any shipper planning to use bales or bundles should first carefully read and understand Section 3-D of Rule 5 to make sure of using the package which shows the lowest net cost and freight rates as balanced against the cost on an oversize or overweight box.

The term "in packages" is almost as lenient as the term "loose" and means in effect that no packaging requirements are imposed provided the carrier considered the package to be "reasonable and proper protection" under the wording of Rule 5, Section 1. Applied specifically to fibre containers the term "in packages" means that a box or wrapper may be used without regard to style, test, size, weight or sealing methods.

"Wrapped" is a term usually applied to furniture shipments and means that all finished surfaces and upholstered parts must be protected and wrapped in a choice of indicated materials, one of which is usually fibreboard. No restrictions are imposed regarding the style of the box, its strength or sealing methods. Often creased sheets or semi-boxes are used secured with metal straps.

Occasionally one encounters the term "in cartons—See note" and this usually refers to a specific exception which differs from Rule 41. There are many hundreds of such exceptions so that it is always desirable to look up any new items for the exact packing required.

All fibre containers conforming to the Rule 41 defini-

tion of "boxes" must carry a circular boxmaker's certificate. If oversize or other containers not conforming to Rule 41 are permitted, a rectangular certificate is required with the name of the item included such as "Box for Brooms." Packages containing fragile articles or articles in glass or earthenware must be marked "Fragile—Handle With Care" or similar precautionary marks (Rule 6, Section 2).

When used for LCL shipments boxes must either show description of contents or an identifying symbol or number which must be explained on the shipping order and bill of lading (Section 7-B). The bill of lading must also be endorsed, "The fibre boxes used for this shipment conform to the specifications set forth in the boxmaker's certificate thereon and all other requirements of Rule 41 of the Consolidated Freight Classification" (Section 7-C). Many new users of fibre containers have been puzzled by 20 per cent penalties assessed on the freight charges due to failure to endorse the bill of lading in this manner.

Dangerous articles—In the present connection the expression "Dangerous Articles" includes explosives, fireworks, ammunition, inflammable materials, corrosive liquids and poisonous substances. The regulations covering the shipment in fibre containers of dangerous articles are promulgated by and published by the Interstate Commerce Commission through the Bureau of Explosives and take precedence over all other freight regulations including every form of transportation. Naturally these regulations are more severe than for ordinary freight and are more rigorously enforced. The reason for this is obvious and in actual practice this strictness has paid big dividends in human safety and material savings.

For instance, in normal years 500,000,000 lbs. of explosives are shipped over our transportation system and for a period extending well over ten years this shipment has resulted in no damages, no injuries and no deaths. The Bureau of Explosives was first created in 1905 and the complete regulations governing shipping containers may be secured in the form of a bound book by applying to the Bureau at 30 Vesey Street, New York. From time to time supplements to this book are mailed to subscribers and several times a year a docket is published listing applications for changes which have been requested by shippers or proposed by the docket. Reference to the Bureau of Explosives regulations will also be found in Rule 35 of the Freight Classification.

Effective January 7, 1941, the Bureau of Explosives was greatly simplified so that in place of the many specifications previously applying on fibre containers the new regulations concentrate all of these into one single group known as specification ICC-12B. Other minor specifications are still retained such as 12C and 12E which refer to patented and other seldom used containers. Among the simplifications effected in the new regulations was the elimination of ICC requirements for the shipment of paints, lacquers, etc., by freight (but not by express) and an increase in the weight limits for exemptions on certain other items. Shippers of dangerous articles should study these new regulations carefully as otherwise they may be using a container more expensive than required. Also the great expansion in national defense means that many industries will be shipping ammunition and other dangerous articles for the first time.

The Bureau is very strict in regard to its requirements for labels and markings. Certain boxes must carry a distinctive colored paper label. For instance, a red label is used for inflammable liquids and a yellow label for matches. These labels may be purchased from the Bureau or may be printed in the correct color on the container by the boxmaker. In other cases where no label is required the box must be printed, "No label required." This is especially true of freight shipments as most express shipments must carry labels. In addition nearly every item requires certain type matter on the box such as "Handle carefully," "Keep fire away," "This side up" and most often the name of the contents. The bill of lading and shipping order must also be endorsed with certain statements such as reference to label requirements. Cars also in some cases must be placarded. These details are important.

Effective March 1, 1935, the Interstate Commerce Commission extended its jurisdiction over the shipments of dangerous articles on interstate common carrier motor trucks, which means that all the regulations applying on this merchandise when moved by rail freight must also be complied with for truck shipments. These truck regulations are also published by the Bureau of Explosives. This is not the case for non-dangerous articles.

At about the same time the Bureau also issued regulations covering the transportation of this merchandise on freight and freight-and-passenger vessels.

Motor truck—There are today no motor truck regulations covering the strength and construction of fibreboard boxes and theoretically any under test container can be used, in which case the truck would have a decided advantage over the railroad. Discussions are now under way with the object of developing uniform strength regulations for both trucks and rail freight.

Parcel post—The Post Office Department has not issued any blanket order containing specifications for fibre containers. Scattered through their other publications, however, will be found items where corrugated boxes are specifically recommended. These include valuable or breakable merchandise such as cigars, cut flowers, liquids in glass and the like. The parcel post regulations recommend the use of strong wrapping for outer packaging and since the post office looks on fibre containers as excellent answers to this requirement, a great many corrugated boxes are in daily use for parcel post shipments. In addition to offering protection, these boxes are easy to seal efficiently, are light in weight and make a good appearance. Such packages may not exceed 100 in. in length and girth combined. In measuring a parcel the greatest distance in a straight line between the ends is taken as the length and the distance around the parcel at its thickest part is taken as the girth. Shipments of liquids in glass are accepted up to certain definite limits but this does not apply on liquor. The limits are much lower on inflammable liquids.

In general the parcel post requirements are difficult to

interpret and apply on new or unusual packages and in such cases the safest procedure is to submit such a package in its final form to the local postmaster before instituting shipments.

Wooden containers

Crates—The simplest form of wooden container is the ordinary crate. Actually the modern crate is not at all simple since an enormous amount of engineering study has been devoted to its structure in order to combine the maximum of strength with the minimum of expense. Much of this research was carried out by the Forest Products Laboratory at Madison, Wis., augmented by the engineering staffs of the larger producers of lumber and wooden containers. The Forest Products Laboratory has published its findings in a series of bulletins and all crate users should own and study these publications. Not only are the best designs illustrated, but valuable information is also given regarding the proper kind and use of nails for each size and style. This is of paramount importance inasmuch as the method of nailing often means the difference between a good crate and a bad crate. The general Freight Classification specification (Rule 40, Section 2) for crates is very brief, simply stating that they must be made of wood to protect contents on the sides, ends, top and bottom and so constructed that freight may be taken in or out of the car within the crate; that contents must be securely held within the crate, and that no part of the contents shall protrude. Surfaces liable to be damaged must be fully protected. A detailed description of crates for specific merchandise will be found under Paragraphs Nos. 530 to 568, inclusive, of the Package Descriptions, in the Classification.

Wood-framed containers—Progressing from the open crate, we come to the wood-framed container which can be considered as a crate with enclosed panels. These panels protect the contents from the weather, dust and outside contact. Originally these panels were made of plywood and many still are. Later, solid fibreboard and occasionally corrugated board were substituted for veneer in the interest of economy, lighter weight, and to furnish a surface for display printing. Typical uses are for shipping console radios, cabinets, textiles and other large objects which are not excessively heavy.

The freight specifications for wood-framed containers, either corrugated or solid fibre panels, will be found in Section 3 of Rule 41 of the Classification and specific styles are described under Packages Nos. 781, 785, 824, 839, 853, 874, 885, 888 and 915.

Wire-bound boxes—These are essentially wood-framed veneer boxes except that the patented construction permits them to be delivered KD as shooks and they have a lid which can be opened and reclosed. The ingenious use of attached wire reinforcement permits of considerable economies in cost and weight without sacrificing strength. Much of the income from royalty is plowed back into continuous research and sales promotion. Examples are the recent experiments in which fibre slats are combined with veneer slats and panels.

Wooden boxes—We now come to the old reliable standard wooden box. However, it also has received a lot of scientific study and has developed into many specialized forms for specific purposes. Thus, there are uncleated boxes, others with cleats either outside or inside and various forms of end framing. Some are tongue and grooved, others have lock corners, while special styles are built to order for many specific purposes. In all styles, however, nailing is of utmost importance. The nails must be the right size and kind and they must be driven properly. Here again the Forest Products Laboratory has contributed valuable scientific data which are available to anyone interested.

The railroads do not attempt a general description of wooden boxes other than to say (Rule 40, Section 1(a)) that they must have "solid or closely fitted sides, ends, tops and bottoms securely fastened" and that (Rule 5, Section 1(a)) they must be "in such condition and so prepared for shipment as to render the transportation thereof reasonably safe and practicable." Incidentally, this last clause applies on *all* shipments tendered for freight regardless of the container used. Detailed descriptions of wooden boxes for specific merchandise are under Packages Nos. 179 to 274, of the Classification.

Miscellaneous containers

The Freight Classification recognizes a number of other types of containers and a brief reference to them follows:

Baskets—These include baskets made of steel, wood, rattan, splint, bamboo, staves, veneer, willow and wicker. All of these and a few others will be found under Packages Nos. 146 to 169, inclusive, at the end of the Classification book.

Hampers—These are usually made of rattan or canvas, the latter sometimes being lined with wire netting. See Packages Nos. 602 to 606, inclusive, for details.

Marking

The need for plain legible marking on containers is obvious, but too often ignored. For instance, great care should be observed in showing the correct state in which the town is located and writing or stenciling this state or its abbreviation should be done very legibly. The reason for this is the almost unbelievable duplication of place names in the United States. Thus, there are 88 towns by the name of Summit and 23 different city names occur in the United States over 20 times each. Other common examples are Washington, Springfield and Manchester. Mass. is often mistaken for Miss., Cal. for Col. and Me. for Mo. Care should always be observed in obliterating all old marks and in the use of plenty of ink with brushes. Free-hand lettering should be avoided and a stencil cutter will soon pay good dividends.

Cabinets—Packages Nos. 430 to 433, inclusive.

Carriers—This form of container is used for shipping such items as empty glass bottles, bananas, oysters and foods refrigerated with either water ice or dry ice. These refrigerated carriers are insulated. Carriers are often mounted on wheels. Details are shown under Packages Nos. 460 to 473, inclusive.

Trunks—Trunks are often used for such items as sales-

men's samples and are listed under Packages Nos. 714 to 718, inclusive.

Egg cases—Egg cases for freight are usually made in standard styles of wood although recently solid fibre and corrugated have been added. Detailed specifications will be found in Packages Nos. 511 and 512 while Package No. 893 describes the fibreboard case for shipment of small quantities.

Racks:.....Packages Nos. 690 and 691.
Reels:.....Packages Nos. 695 and 696.
Rolls:.....Packages Nos. 700 to 708, inclusive.
Tubes:.....Packages Nos. 720 and 721.
Trays:.....Packages Nos. 789 and 875.
Beams:.....Package No. 790.
Ballots:.....Package No. 768.
On Boards:.....Package No. 769.
Flasks:.....Package No. 774.

Shipments without containers

Any discussion of shipping methods must include the various methods of making "loose" shipments. At first glance this does not seem very complicated or scientific. Nevertheless, great strides have been made in recent years in the perfection of the various methods for loose shipping.

The original and obvious loose shipment consists of large bulky items, such as machinery, automobiles and other merchandise either too large to go in a container or else of such a character as to render a container unnecessary. Inasmuch as many of these items are non-recurring and have their shipping and bracing methods worked out individually, it is not possible to cover them in an article as short as the present one. Also it is not desirable to discuss here the shipment of such bulk commodities as coal, grain, etc., except to point out that even here new developments are constantly being adopted such as the carload shipment and handling of bulk cement, molten asphalt, fluid milk, acids and various chemicals.

Of chief interest to us, however, are the many novel methods being used as an intermediate stage between bulk and package merchandise. The modern scientific study of metal strapping and its uses has been one of the chief contributing influences. The proper use of metal strapping has developed within recent years a whole new technique in loading and bracing merchandise in freight cars. One development is referred to as "unit loading" wherein the contents of a freight car are divided into units which, in turn, are held together with metal bands or wires. No other bracing is used, and the "units" may shift in the car, thus reducing the effects of any severe impacts.

In another method, known as an "anchored" load, the load is stowed in the car in the usual manner and held back and braced by metal bands or wires which are fastened or anchored to the walls of the car at least 3 feet back from the face of the load. The bands or wires extending from the anchors are brought around the front of the load, tensioned and then sealed. Sometimes when the nature of a load requires, a wooden gate is placed in front of the load and the bands sealed against it. As a result, greater economy and efficiency have been made in the C/L shipment of such merchandise as automobile frames and other chassis parts, rolls of paper, sewer pipe, drums, barrels, crates and similar items. Other modifications of these methods are "bulkbinding," "anchor strapping" and "Conbur bracing."

Complete technical information and assistance is readily available to all shippers on application to the manufacturers of metal strapping or to the various railroad and government agencies such as the Freight Container Bureau (Conbur), the various Shippers Advisory Services, the Transportation Division of the Association of American Railroads, the Mechanical Division of the A.A.R. and the Forest Products Lab. at Madison, Wis.

The Freight Classification also gives much detailed information on this subject under Packages Nos. 478 to 485, inclusive, and 625 to 655, inclusive. These include methods of bracing and protecting such loose items as pianos, canoes, bottles, building tiles, crucibles, sewer pipe (including the "double unit method") and others.

Bracing

Great improvements have been made in methods of bracing, dunnage (see Rule 30 of the Classification), protection at car doors and proper storage in the car. Consult the Transportation Division of the A.A.R. for their voluminous illustrated data. A notable and extremely recent development involving the latest technique in metal strap bracing has been the skillful methods worked out for the boxing and securing of aircraft for rail transportation on flat cars. Two different companies are now specializing on this from a nationwide standpoint.

Skids and pallets

This is another interesting method of shipping which lies between loose handling of materials and complete packaging. It probably started in the paper industry where several hundred pounds of sheets were loaded onto a plain wood skid, wrapped with waterproof paper and securely strapped to the skid for shipment to the printer. Other industries, notably the manufacturers of automobiles and electrical goods, were quick to realize the advantages and economies of this method of transportation and are now using it wherever possible for shipping such items as small motors, wheels, bumpers, clutches, mufflers, fire brick, etc. Additional advantages are the speed with which these skidded units can be handled in or out of the freight car and the convenience of storing.

Simple skids are also used in combination with fibreboard for the protection of heavy objects of a fragile nature such as furniture, refrigerators, ice cream cabinets, etc. Some of these are described in the Classification under Packages Nos. 678 (refrigerators), 710, 711, 712 (using insulated blanket), 752 (telephone booths), 754 (furniture) and 824 (refrigerators).

Another modification is that of strapping several items together without a skid and without any outer container although it is sometimes desirable to have protection between the items. Examples are auto springs, auto fenders, hides, etc.

Corrugated & fibre shipping boxes

by R. L. Beach

The general subject of corrugated and solid-fibre shipping containers has been quite thoroughly covered in previous issues of the PACKAGING CATALOG and other publications, notably in the articles by Malcolmson in the CATALOG's 1938 and 1943 editions. These have fully described the styles of fibreboard shipping containers, the nomenclature of the industry, the specifications of the Official Classification Committee and of some of the war procurement agencies, and the advantages of fibre shipping containers for general shipping purposes within certain limitations.

There has been little published literature, however, on the wide variation of the different available grades of corrugated and solid fibreboard, the reasons for this variation, and the characteristics of the grades which make their use desirable for the protection of certain specific products.

The Fibre Box Association estimates that approximately 318,000,000 corrugated and solid-fibre boxes will have been used in 1943 and that 350,000,000 boxes will be required in 1944. A considerable percentage of these boxes will be of the water-resistant V-type board for overseas shipments by the war agencies. The large majority, however, although they will be carrying products essential to the war effort instead of goods for civilian requirements, will continue to be made of the grades of board which have been in use for many years for domestic shipments.

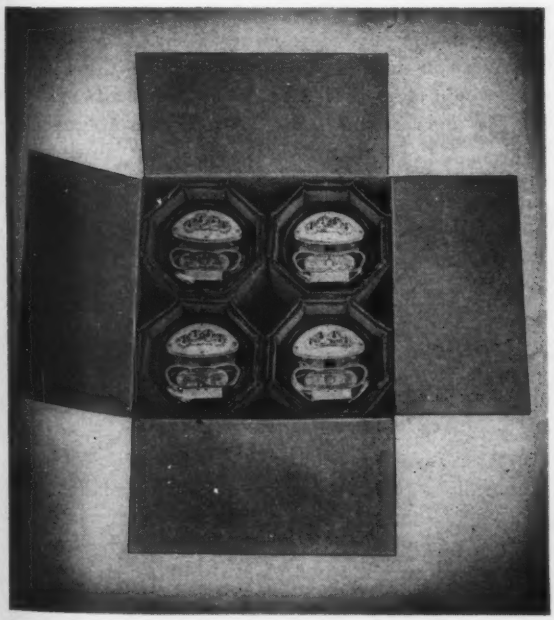
The grades of board, design of containers and interior packing requirements for the war-essential products will, to a great extent, be the same as for containers used for civilian requirements before and after the war. Therefore, any discussion of the service requirements of shipping containers, and how these requirements can be met by selection of the proper grade of board and the proper container design, applies as well to the future needs of industry as it does to the industry's present wartime requirements.

A large number of these boxes will be used for food and related commodities, and their design and materials have become well standardized through years of shipping experience. There will be, however, hundreds of thousands of fibre containers used for new materials and apparatus.

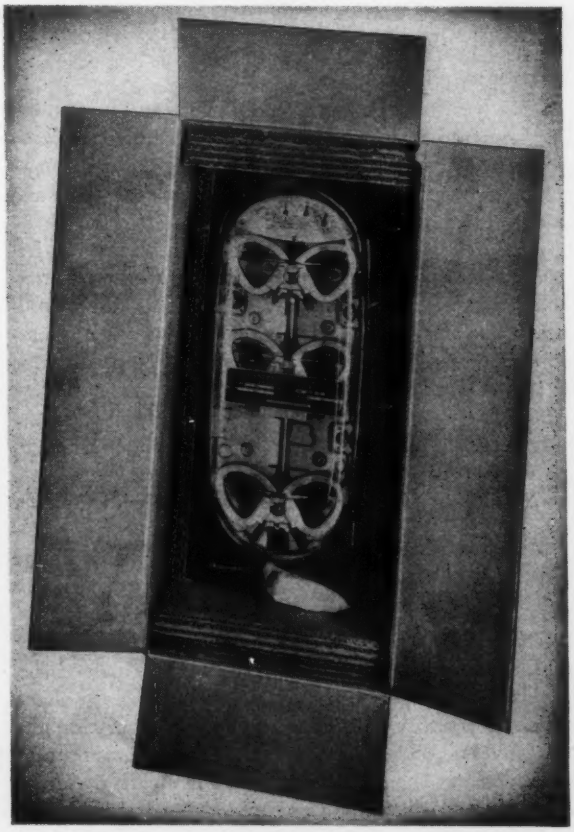
Very considerable knowledge and skill will be required in the selection of the proper type of board for these containers, and much care will be necessary in the design of the interior packing pieces or whatever

1. Corrugated-board shipping container holding watt-hour meters, each wrapped in corrugated board which forms a suspension cushion. 2. Corrugated board used for interior packing to cushion a moderately heavy very delicate instrument. Photos General Electric Co.

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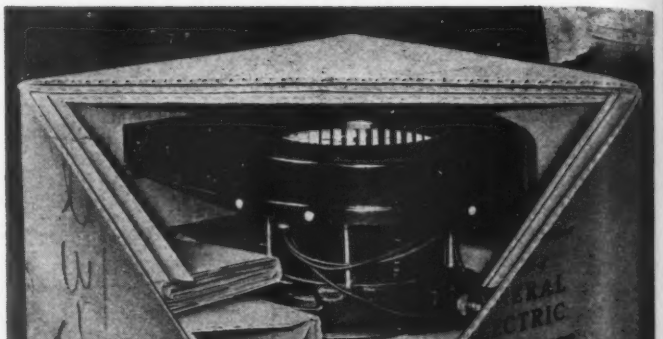


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3



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3. Cut-away view of corrugated-board container showing interior packing used to cushion electronic tubes. 4. Corrugated shipping container with corrugated board used as the interior packing for a motor compressor for an oil burner. Photos General Electric Co.

other forms of cushioning might be employed to do the particular job.

Service requirements of fibreboard

As has been previously stated by many authorities, the service requirements of fibreboard shipping containers come under three general headings: first, retention of contents; second, resistance to compression (top and ends); third, resistance to puncture.

Retention of contents, an obvious necessity, is frequently measured by the edge or corner drop tests or by the drum-testing machine developed by the Forest Products Laboratory and in wide use in various other laboratories. The Conbur tester, recently developed by the Freight Container Bureau, will also give information.

Resistance to compression in a container is necessary in order to permit stacking in warehouses and to withstand successfully the shocks of transportation—particularly from end to end—when loaded in freight cars. This resistance is measured by any one of the several types of compression-testing machines of suitable capacity available from various manufacturers, and in general use in practically all box-testing laboratories.

Resistance to puncture is a most important quality of fibreboard, since it insures that the commodities packed in containers are not damaged in transit by sharp articles, corners of wooden boxes, etc. The bursting test has for years been recognized by the Official Classification Committee as the standard test of this quality. However, the recently introduced General Electric boxboard puncture tester indicates that this method of testing may be a more accurate index to the resistance to puncture of a wide range of corrugated and solid fibreboards.

The Official Freight Classification shows five grades of single-wall corrugated board having bursting-test values of 125, 175, 200, 275, and 350 lbs., and five grades of double-wall corrugated board having bursting-test values of 200, 275, 350, 500 and 600 lbs. Also, for certain commodities, double-wall corrugated boxes testing 900 lbs. are approved (Package No. 808, Consolidated Freight Classification, No. 15), although it is not known whether or not such extremely high-test boxes are being used for these commodities at the present time.

The bursting-test requirements of the Official Freight Classification from 125 lbs. minimum to 900 lbs. maximum would indicate that grades of fibreboard are available having a strength value through an approximate range of 1 to 7. However, work at the Institute of Paper Chemistry at Appleton, Wis., indicated that the actual service strength of fibre containers covers a far greater range than the 1 to 7 ratio. This subject was reported by Wells, Kaplan and Ayers at the annual meeting of the Technical Association of the Pulp and Paper Industry, February, 1943. In a preliminary way, their report covered a very thorough investigation of the comparative strengths of a limited number of grades of board measured by the machines described in the foregoing, and others similar to them.

So far as is known, there has as yet been no study, by the various types of measuring apparatus available, of the comparative strengths of the entire range of board and boxes from the lightest bursting-test grade to the heaviest. However, any designer of fibre containers can safely assume that the ability of the heavier grades of

board to meet service conditions will be ample when properly designed and tested by recognized laboratory methods or actual shipping tests.

A recognition of the wide variety in quality of the standard grades of fibreboard explains why fibreboard boxes are definitely suitable for commodities having vastly different protection requirements. On the other hand, failure to recognize the qualities of the standard available grades of fibreboard and their proper utilization has been one of the chief causes of some disastrous experiences in shipment. The mere selection of a heavier and more costly grade of board for a container, because of unsatisfactory experiences with a previously used container, does not insure that the redesigned container will prove more suitable unless the causes of the original failure are analyzed and a proper grade of board is used.

Cushioning

One of the most frequent causes of trouble commonly known as "concealed damage" is the breakage of more or less fragile articles. In general, this damage is caused by lack of proper cushioning directly around the article itself or lack of properly designed interior packing. In this case, the substitution of a heavier and better grade of corrugated board for the shipping container will not correct the trouble.

Frequently mention has been made of the suitability of corrugated containers for articles of a more or less fragile nature because of the cushioning quality of corrugated board. This is too general a statement to help in the selection of the proper grade of board for a fragile article, since cushioning is a variable quantity, depending upon the weight of the article and the amount and velocity of movement. That is, a material which might provide most excellent cushioning for an object weighing a few ounces would be valueless for an article of the same size weighing several pounds.

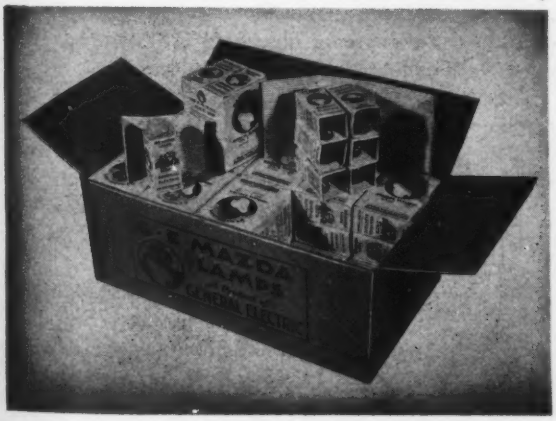
To date no instrument is commercially available for measuring cushion, although several laboratories have developed experimental apparatus for particular problems. While it is generally recognized that even though the cushioning quality of corrugated board depends basically on the corrugated sheet, it is nonetheless a fact that the degree of cushioning of any particular grade of corrugated sheet varies according to the weight, thickness and stiffness of the linerboard with which it is combined, and is *inversely* proportional to it. In other words, the lighter the grade of liner, the greater will be the degree of cushioning, other factors being equal. The reasons for this are not well understood, and will not be until exhaustive study of a larger number of boards is made by some type of apparatus yet to be developed.

Since the degree of cushioning inherent in a piece of material cannot at present be measured, the container, completely packed with its contents and ready to be shipped, must be tested as a whole in order to determine the proper materials to use both for interior packing and for the container itself. This can be done by the use of the drum tester, the Conbur tester or by drop test from various heights. These tests, however, must not be run to the point where the container itself fails, or the information desired on the degree of interior cushioning will probably be destroyed.

It should not be assumed, therefore, that for the shipment of any article susceptible to damage by concussion the mere use of a corrugated container is all that is neces-

5. Household incandescent lamps are packed and shipped in corrugated board. 6. Typical cleated fibreboard shipping container. Photos General Electric Co.

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sary. Because of the weight or size of the article, it may be necessary to use a comparatively high-test grade of corrugated board which cannot be relied upon to provide the necessary degree of cushioning. In this case, in order to protect the article from damage caused by shock, it is necessary to obtain the required degree of cushioning by proper interior packing. It should also be kept in mind that all of the corrugated boards obtainable for boxes are also available for interior packing pieces, and that any combination of these may be utilized.

Incandescent lamps provide one of the best examples of large-scale use of corrugated board for the shipment of light articles. When packing the regular household sizes, individual lamps are enclosed in a single-face corrugated wrapper, both the corrugated and the facing sheet being of a comparatively light weight, but strong grade, of paper. Six of the individually wrapped lamps are then placed in a single-face corrugated wrapper, and several of these large cartons are then enclosed in a corrugated shipping container. This container does not have to meet a bursting test, since the specifications given for Package No. 256 of the Official Freight Classification, No. 15, stipulate that if the dimensions do not exceed 60 united inches and the maximum gross weight does not exceed 20 lbs., no such test is necessary. This is an excellent example of the use of multiple layers of lightweight corrugated material to provide adequate cushioning, one which by tests and the actual shipments of millions of lamps has provided most adequate protection.

The extreme opposite of this type of packing is that specified in the Official Freight Classification for "Radio or Talking Machines Without Mechanism, Console Type," as outlined in Package No. 835. This ruling specifies that not only must the shipping container test not less than 350 lbs., but, in addition, the corrugated pads used for interior packing must test not less than 200 lbs., the corners of the container must be reinforced, and the cabinet suspended by means of corrugated fibreboard testing not less than 275 lbs., so that the legs are free from pressure. This specification recognizes the rigidity of corrugated board and makes use of this quality where required.

Between these two extremes are built up the specifications covering the packing of thousands of articles of varying weights, dimensions and fragility, and the proper balance between cushioning, rigidity and resistance to tear is worked out for each particular item according to the amount of each quality needed.

The Official Freight Classification in Rule 5, Section 3, provides that under certain conditions commodities acceptable for shipment in bundles may also be shipped in fibreboard boxes not conforming to Rule 41 of the Classification. In general, the service quality required in boxes for such articles is a high value of retention of contents, since these articles are frequently sharp, loosely packed and of high density. Consequently, the corrugated boxes frequently fail by splitting at the scores and spilling the contents. Usually, no particularly high resistance to compression is necessary in the case of such containers.

War and postwar fibreboard

The requirements of the armed forces for fibreboard boxes for overseas shipments have led to the development of both corrugated and solid fibreboard of far higher test strength, no matter how measured, than ever obtainable heretofore. Irrespective of how the rules of the Freight Classification Committee may be modified after the war to take advantage of the available higher strength fibreboard boxes, undoubtedly as soon as the V-boxes are no longer needed for military requirements they will come into wide use for both domestic and export shipments of articles previously considered as impossible to ship in fibreboard containers. The exact service strength of these containers as compared with the best grades of regular domestic containers is not yet known, but it is very appreciably higher, and should result in their being used widely.

It is quite probable that an expected wide postwar use of fibreboard for shipping containers will be in the form of cleated fibreboard boxes, or as they are defined in the Freight Classification "Crates, fibreboard lined." With this form of construction, the requirements for resistance to compression and retention of contents do not depend to any extent upon the strength of the fibreboard, but are met by the edge cleat specifications, that is, cleat dimensions, corner construction, nailing, etc. The fibreboard panels are required to protect the contained articles from damage by puncture only, a factor easily taken care of by the selection of a suitable grade of fibreboard.

In addition to the increased strength characteristic of this type of container, it also has the very distinct advantage over a slotted carton container of being easier to handle in warehousing and carloading. This is because the external cleats provide means for obtaining a firm hold on the container, either by hand or crane hooks. For boxes of over about 50-cu.-ft. capacity, this is a very definite advantage.

Before the war, this container was coming into use to a considerable extent for such articles as refrigerators, office furniture and large cabinets. Its use would probably have become more widespread had not box manufacturers lacked the facilities to fabricate the shooks, and box users lacked the nailing equipment. The many advantages of this type of container will undoubtedly result in manufacturers and users obtaining the necessary equipment as soon as possible after the war. Consequently, the tonnage of fibreboard used for such containers will undoubtedly be considerable.

The present wide use of fibre containers—and the probable future growth of the industry—is largely due to the many grades of material obtainable and the ease with which it may be fabricated into various forms of shipping containers and interior packing. Obviously this has made it possible to design complete packing units for products having widely different characteristics.

The growth of the industry has been very great in the past decade, but because of the demand for serviceable, lightweight packing to meet anticipated shipping conditions, it probably has been small in comparison with future expansion.

steel barrels & drums

by R. W. Lahey

All cylindrical metal containers of 10-gal. capacity and larger are classified as drums; both single-trip and returnable (multiple trip) packages are included. The shortage of steel sheets has required that production be limited to drums for packing products for which no substitute has been found. Products which have not been considered essential to our wartime economy have also been prohibited the use of steel containers, although in some instances substitutes have proved far from satisfactory. Nevertheless, drum-manufacturing capacity has been taxed at times by demands from the Army, Navy and other governmental agencies.

Government restrictions and specifications

The drum industry has been operating under two WPB orders: Limitation Order L-197 listed the products which prohibited the use of these containers; Allocation Order M-255 required that priority ratings be obtained from the Containers Division, and after assignment of ratings it was necessary to obtain permission from the Containers Division to purchase the drums. On October 2, 1943, the WPB amended L-197 and cancelled Allocation Order M-255. A drum user is now required to file WPB Form 3233, which when approved, contains permission to purchase, as well as a priority rating. If it is desired to pack a new or a restricted product in steel drums, the same procedure applies—that is, file WPB 3233. The purpose of the amendment, merging the two orders, is to eliminate a good portion of the paper work and to control more positively the use of steel containers.

The Army and Navy published, on Feb. 15, 1943, specifications for drums for packing overseas shipments. (U. S. Army Spec. 100-14A and U. S. Navy Spec. 39P16a). Anyone interested should obtain copies from the Army or Navy.

Changes in construction

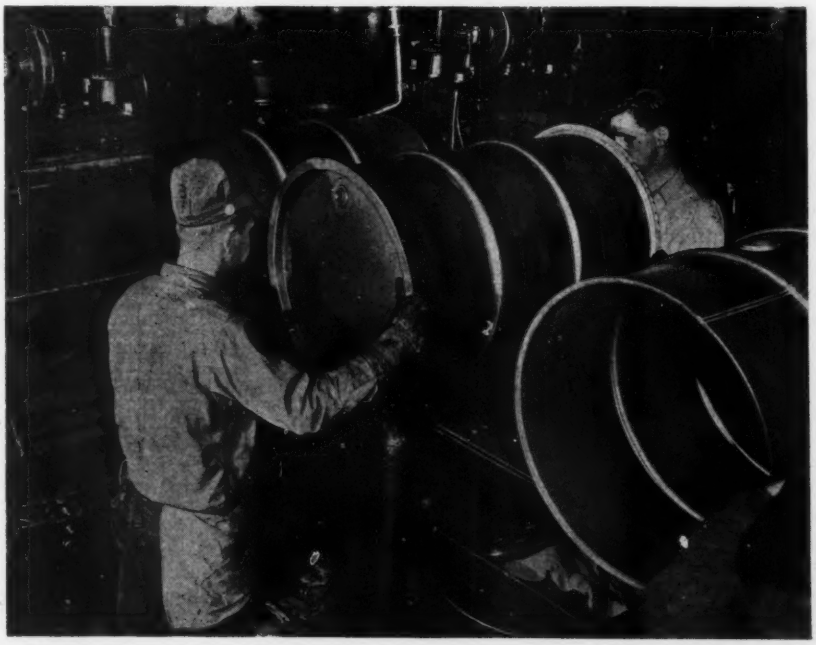
No major changes in construction of steel drums have been made during the past year. Manufacturers have had to use all of their efforts on production in order to supply the unprecedented demand for standard types of steel containers. However, one improvement, started a few years ago, is worthy of mention: the infra-red oven has been used for baking drum coatings with very satisfactory results. It has been found that baking times can be reduced and tougher more uniform coatings result.

Reconditioning

The shortage of drums has changed the classification of most liquid containers from single-trip to returnable containers. This has caused shippers to install cleaning equipment or to have reconditioners do this work. Equipment for drum reconditioning should include provision for washing, air testing for leaks under water, drying, repairing and painting. Repairing includes welding of small holes, removing large dents and—in some instances—replacing leaky flanges. The choice of cleaning equipment is dependent on the number of drums to be cleaned and the degree of protection from contamination that customers require.

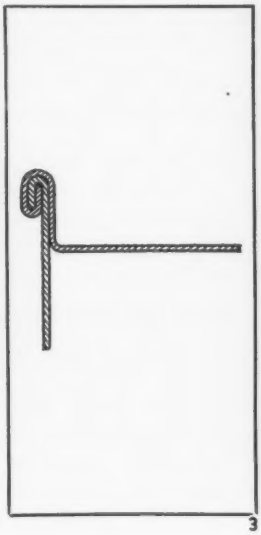
Reconditioners prefer to grade down drums rather than

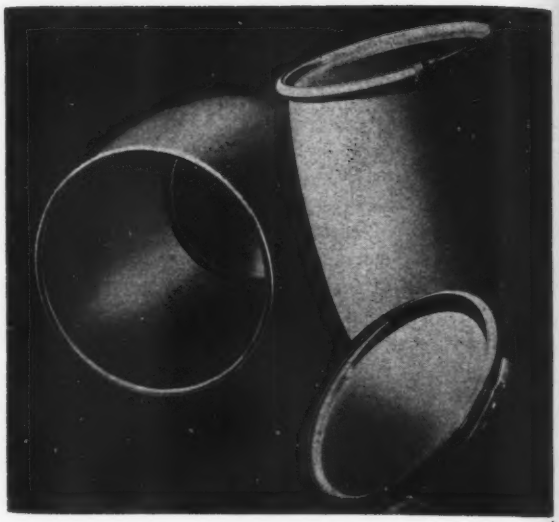
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1. In making steel drums, a sealing compound and five thicknesses of metal, firmly contacted, make a tight seam. Sometimes a reinforcing hoop is applied over the chime. Photo Socony-Vacuum Oil Co., Inc.







2. A 55-gal., 18-gauge drum for transporting liquids. Note corrugation in cylinder, expanded rolling hoops and mechanically pressed openings. 3. Double-seam construction for the locking heads and cylinders of metal drums. 4. Hackney seamless bilge barrel. Note locking head and the smooth inner surface. Photo Pressed Steel Tank Co.

to spend extra time cleaning and repairing. If the drums are used for transporting dangerous articles, and permission has been obtained from the Bureau of Explosives for the re-use of ICC specification single-trip containers, they must be tested for leaks with air pressure—as required by the specifications—before they can be refilled and shipped.

Returnable drums—16 gauge and heavier

These drums are, as the name implies, of rugged construction, built to withstand transportation abuses and for long life. They are manufactured in sizes of from 10- to 110-gal. capacity, and are specially constructed to meet the individual requirements of each product to be shipped in them. They are designed to provide for the safety and convenience of the men who fill, handle, empty and clean them.

The majority of these containers are fabricated from 12- to 16-gauge black steel sheets which, when required, may be sheet or "hot dipped" galvanized, tin dipped or terne plated. They may be lined with rubber, lead bonded or lined with light-gauge chrome-nickel-steel or aluminum sheets. Drums are also made of solid aluminum, chrome-nickel-steel and nickel, depending upon the product to be transported in them.

These heavy returnable drums are made in both the full-open-head and tight-head types. The former are popular for packing dry materials or semi-liquids. The covers of these drums are usually held in place by metal rings, equipped with lever locks or bolts.

The tight-head drums are usually equipped with two small, screw-threaded openings, one $^{3}/_{4}$ in. in diameter and one 2 in. in diameter. These openings are also available in the $1^{1}/_{2}$-in. and 2.3-in. diameters. The latter has a special jumbo thread which is used for drums containing acids and other corrosive materials. Forged steel flanges are best, and they should be welded into the drums. The Metal Barrels and Drums Committee of the Manufacturing Chemists Association has developed a new drum plug and wrench which should be available to users during the year 1944.

Bilge barrels are fabricated by cold drawing of the metal or by forming the cylinder with butt-welded joints. Bottoms are welded or brazed, and inside bottom crevices are closed by fillet welding. Lighter gauge metal can be used in the fabrication of the butt-welded drums.

Straight-sided drums are usually constructed with welded body seams. Heads are attached by double seaming or welding, and both types are generally supported with 12-gauge reinforcing chime rings. One special type is fabricated from two cold-drawn seamless cups which are welded together circumferentially. Both head chimes are protected by welded rings. "I" bar rolling hoops serve to protect the side walls and facilitate handling.

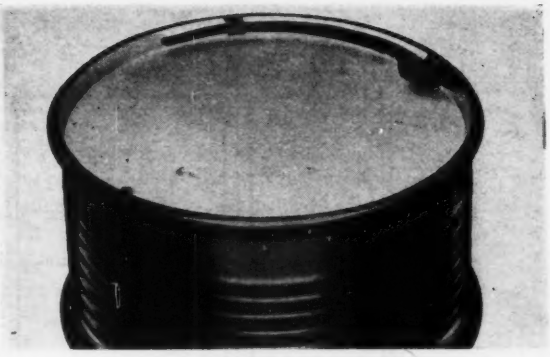
These containers should be shaped to allow complete drainage. Any crevices in the chimes or depressions in the sidewalls or heads—such as beads adjacent to the rolling hoops or flanges—will collect foreign materials and thus will result in greatly complicating the cleaning operations.

Returnable drums of 55-gal. capacity are the maximum size recommended. Larger drums are too heavy for safe or economical handling. The Chemical Industry standardized on the 55-gal. size for liquids. The only other size used in this industry is 5 gal. which is classed as a pail.

Returnable containers for dangerous articles must meet one of several ICC specifications depending upon the classification of the products they transport. The 5 and 42 series Specifications are for liquids, and the 6

5 and 6. This 18-gauge, 55-gal. Quicklox steel drum with ring and lever closure is usually used as a single-trip container. Photo Stevens Metal Products Co.

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series for materials of the solid type. Consolidated Freight Classification Committee Rule 40, Section 5C, governs the construction of this type of drum when used for the transporting of non-dangerous articles.

Steel drums—18 gauge and lighter

The 18-gauge, 55-gal. drum is the most popular steel container for transporting liquids. Before the emergency it was the general practice to use these drums as single-trip containers—the customers either re-used these containers or sold them to reconditioners. These drums are now recaptured by the original shipper for further service unless the return trip is too great. Rule 40, Section 5C, of the Consolidated Freight Classification Committee provides the specifications for these returnable containers when used for transporting liquids that are not dangerous. ICC Specifications 17C, 17E and 17X govern the construction of these drums for single trips only when they carry certain dangerous liquids authorized by the ICC Regulations for the Transportation of Explosives and Other Dangerous Articles. Special authorization can be obtained on application to the Bureau of Explosives for the re-use of these drums for transporting dangerous articles.

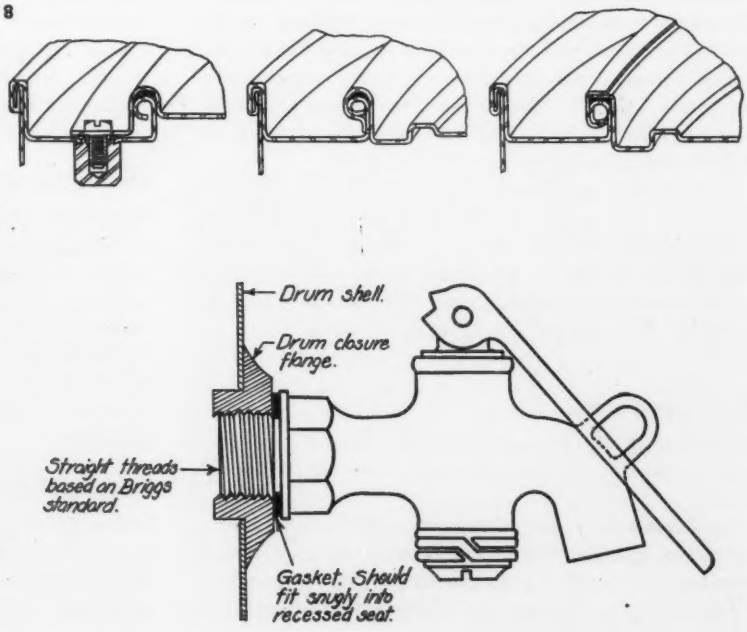
The construction of these drums includes electrically flash-welded side or body seams. The heads are secured to the bodies by double seaming. A compound of animal glue or rubber is used to make this joint liquid-tight. Rolling hoops are expanded or rolled in the bodies to facilitate handling. Series of corrugations are often

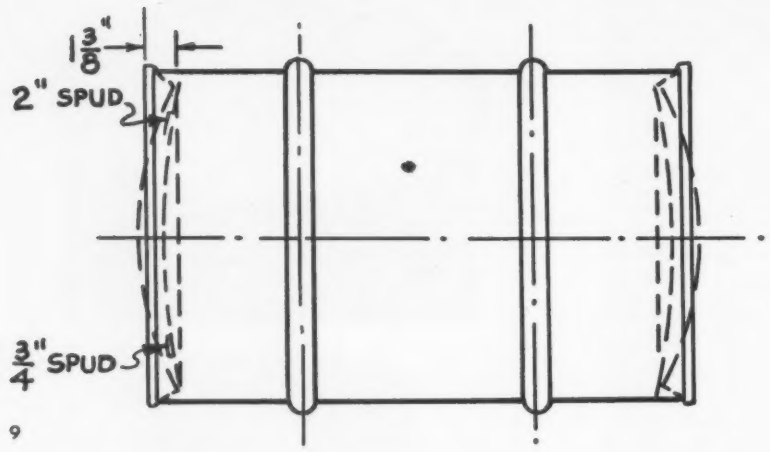
7. A 55-gal. drum made of 18-gauge steel, generally used for transporting of pastes and semi-liquids. Photo Stevens Metal Products Co. 8. Drawing at upper left shows construction of the bolted cover; center, the lug seal; right, the ring-seal cover. Lower drawing is a diagram of the lock faucet for dispensing contents of steel drums.

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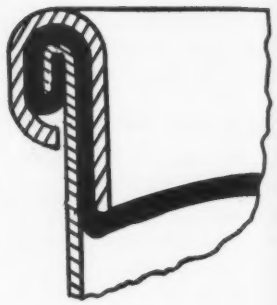


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9. Diagram of 55-gal. steel barrel which has 18-gauge shell with expanded hoops, 18-gauge head and bottom. Chime is reinforced with 11-gauge reinforcing ring. 10. Detail of the chime reinforcing ring. Diagrams Wheeling Steel Corp.

rolled in the sidewalls between the rolling hoops and the heads to stiffen the containers.

Open-head drums containing levers or bolted closing rings are usually used for packing heavy liquids, greases and the like.

Tight-head drums are equipped with pressed-in flanges and these openings may be obtained in $^3/_4$-in., $1^1/_2$-in. and 2-in. sizes, and be inserted into the drums at any practical locations. Where necessary, portholes are used for complete drainage. The plugs are of the screw-thread type and are equipped with gaskets fabricated of rubber, asbestos or other satisfactory material. Metal cap seals, which are crimped over these openings with the plugs in place, are popular because they are tamperproof and afford secondary seals.

Drums holding dry materials differ in details of construction from the liquid containers. They are usually fabricated from 18- to 30-gauge steel. Drums of 28-gauge and lighter metal are used for packing hot liquids which solidify upon cooling and thereby support the containers. Usually 26-gauge steel is required for drums carrying loads up to 100 lbs., 24-gauge for loads up to 200 lbs. and 22-gauge for loads up to 350 lbs.

These drums are usually made with Gordon Lock or lap-welded side seams, of which the latter is stronger. Spot welding at intervals along the Gordon Lock seams adds to their strength. The heads are secured to bodies by the usual double-seamed joint. Sidewalls are stiffened by rolled or expanded corrugations of varying size as may be required.

Drum openings

Of the variety of openings which have been devised for these containers, the most popular types are described below.

The friction lid is most commonly used as it is an effective closure if the bearing surface between the head of the drum and the cover is sufficient to provide a tight fit. A depth of $^5/_8$ in. is adequate. Lids vary in diameter from a minimum of 4 in. to a maximum of 15 in. Covers of this type are usually held in the drums with three or more turnbuckles. Small holes in the ends of these turnbuckles are used to hold them in position by wiring them together. Lead seals can be applied to the wires for tamperproof closures. Friction covers are sometimes reamed or expanded. This makes an extremely tight closure, but once the lids have been removed, they cannot be used for effective re-seals.

The bolted cover is usually specified for containers holding pastes and other semi-liquids and powdered materials where large openings are desired. These lids are secured to the drum with machine screws. Gaskets are required.

The full-open heads are held in place with metal closing rings which are drawn tight with levers or bolts. The heads of these drums are sometimes fabricated of heavier metal than used in the bodies of the containers.

The lug cover is invariably used for closing grease drums. A sealing tool crimps the lugs under the curled portion of the heads. The user must pry out each lug with a screw driver to open the drum.

Drum linings

Both light-gauge drums for liquids and dry materials may be "hot dipped" or sheet galvanized, tin dipped or lacquer lined to prevent contamination. There are many coatings available for lining welded side-seam drums and these must be baked at high temperatures. Sometimes double linings are required. These linings have enabled the use of steel containers for materials which formerly had to be packed in wood, glass, aluminum, or in other materials.

Drum painting and decorating

Drums can be painted in one or two colors and can also be printed, lithographed and even embossed. A proper choice of colors will result in distinctive and attractive containers.

Linings for metal containers

by Elon R. Brown

For years it was necessary to package certain materials in glass or wood containers because of the reaction of these materials to the steel, tinplate or terneplate containers. Special linings have opened up new uses for steel containers in this field. Continuing research has overcome many of the handicaps and is improving those linings already developed.

Generally speaking, linings for steel containers are designed to protect the contents of a container from contamination or discoloration by the steel, rather than protect the container from the action of the materials packaged. In some cases, however, the lining must protect the container from the corrosive action of the contents in addition to safeguarding the packaged material.

Specific problems frequently introduce special considerations, and resistance tests are necessary to determine whether or not linings meet particular requirements. In some cases, experience has shown that two coats of lining are necessary for proper protection. Different types of linings designed for specific purposes assure adequate protection and eliminate dangers of contamination. The war has brought many new problems.

Steel containers for war

One of the major problems today is the manufacture of metal containers for war materials. The protective coatings and linings for these containers must be designed to withstand far more than ordinary abuse and to stand up under many conditions for which they were not originally intended. For example:

The 5-gallon expeditionary water can is a rectangular container, with handles welded to the top and a filler plug in the upper corner. The body of the container is welded with double-seamed bottom. The organic lining lacquer used inside this container must be of the highest quality to prevent water contamination, as most ordinary lacquers give a foul flavor to the water. These containers are handled roughly, often being dropped from a truck or plane. As a result, the lining must resist cracking or flaking when the container is dented. Quite often Army personnel use these containers for making coffee or lemonade, so the lining must withstand these reactions and still protect the steel container against rusting and corrosion.

The expeditionary gasoline can is made exactly like the expeditionary water can, the only difference being in the protective lining. The lining is a one-coat, baked-on system designed to be unaffected by high octane gasoline and also to protect the inside of the container against rusting, corrosion and rough handling.

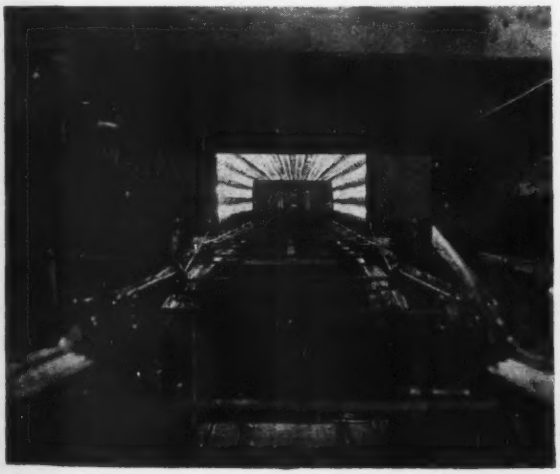
The desert water can was designed to be carried at his side by a soldier. This container is made of light steel and fitted with carrying straps. The container holds about 3 gallons and is so shaped as to rest easily on the soldier's side. The lining lacquer used in this container is composed of a two-coat system—first a primer is applied to the metal in the flat before fabrication and then a finish coat is sprayed over the completely fabricated container, inside and out. This lacquer lining system is similar to that in the expeditionary water can.

The decontamination can is a double-compartment container designed to package bleaching powder above and organic liquid below. Mixed together, these produce a decontaminating liquid used to renovate "gassed" areas, clothing, shoes, etc.

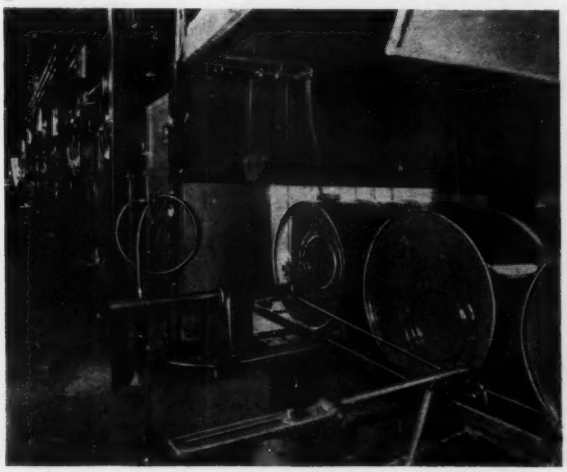
Two different finishing systems are required. A two-coat system is used for the top container and inside of the cover, and a one-coat system is used for the bottom con-

1. and 2. The infra-red oven for the baking of drum coatings and linings has been used with very satisfactory results Baking times have been reduced, and tougher as well as more uniform coatings have been produced. Photos Drayper Mfg. Co.

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tainer and bottom of the top container. The United States Army Specifications for decontamination cans calls for a lining lacquer in the top compartment to withstand one per cent chlorine solution for 96 hrs. at 70° F. The requirements for the bottom container lining specify that the lacquer be unaffected after refluxing for 2 hrs. in the organic liquid packaged in the bottom compartment.

The outside of this container is finished with Warm Drab Enamel as shown on the United States Army Color Card 3-1.

The bleach drum is made of steel and is similar to a 15-gal. drum in size. Because of the fact that the bleaching powder packaged in the drum contains chlorine, a satisfactory lining lacquer is essential because chlorine attacks iron or steel, especially in the presence of moisture when hydrochloric acid is formed. To protect against this, the bleaching powder is kept as dry as possible and a specially designed high-grade lining lacquer is sprayed throughout the interior of the container and cover, then thoroughly baked on. The requirements of this lacquer are listed under United States Army Specifications relating to bleach drums. The outside of this container is finished with lustreless blue-grey enamel to match United States Army Color Card 3-1.

The 30-calibre ammunition case is welded and double seamed from heavy gauge metal and designed to hold one round of 30-cal. shells and the clips and belt as one unit. Inasmuch as this container is also made of steel, a protective coating is required for inside and outside. Therefore each container is dipped into a lustreless olive drab enamel which is especially designed under United States Army Specification ES680 Class 4. After dipping, the case is carefully drained and thoroughly baked under infra-red heating equipment. This process results in a tough, durable coating over the box, cover and fittings.

Steel-container linings for peacetime uses

For normal peacetime uses different types of linings are recommended for individual products. Obviously there is a considerable difference among various substances in their susceptibility to contamination. Some products require a more resistant lining than others, and in certain cases experience has proved that two coats are desirable. There are a great many different types of linings, but in the following charts only the five linings described below are represented, illustrating different problems and considerations. These linings, originally designed for civilian use, are equally effective on war materials.

Type A—This lining is used for some of the more corrosive products formerly packaged in wood or glass. The coating consists of a phenolic base resin with suitable fillers for a primer and a specific type of phenolic resin for the top coat. This two-coat system represents the highest degree of protection in container linings against the greatest variety of products.

The two-coat system is relatively expensive, not only because of the fact that two coats are applied, but because the coverage in a pigmented prime coat is necessarily low. This system is recommended only where manufacturers have been unable to accomplish satisfactory protection with less expensive materials.

Type B—When this lining is properly applied and baked, it becomes hard and glass-like. This is a phenolic type lining insoluble in all known solvents. It is, therefore, especially useful as a lining for packaging such strong solvents as alcohol, chloroform, acetone, varnish remover, nitrocellulose lacquer, thinners, etc. This lining is recommended as a sanitary lining for steel beer barrels and is used extensively in this field.

Drums protected with this lining properly baked and aerated are absolutely free from oleoresinous paint and lacquer odor, and smell much sweeter than a plain steel drum. In containers intended for use where extraordinary protection and complete coverage are required, two, three or even four coat work may be done.

Type C—This lining is being used extensively in containers for edible fats. It is of the same general composition as Type B, but sells at a somewhat lower price and is slightly less effective than Type B in the matter of resistance to the action of corrosive chemicals. Like Type B, it is a modified phenolic base, insoluble in all known solvents. As in the case of Type B, drums protected with this lining, appropriately baked and aerated, are free from oleoresinous paint and lacquer odor. More than one coat work is not recommended with this lining. Where greater protection is required, Type B is recommended.

Type D—This lining is suitable for drums intended to contain edible oils, lubricating oils, greases, industrial and transformer oils. It is a very high-grade lining of the synthetic oleoresinous type, and is the most widely used lining on the market for hydrogenated edible oil products, such as Crisco, Primex, Snow-Drift, Spry, etc.

Empty drums recently lined with Type D show a mild odor which is not transmitted as an extraneous odor or flavor to materials packaged. For this reason, and because of its greater flexibility, a number of manufacturers of edible hydrogenated products prefer this lining to Type B or Type C.



3. A metal container used for 30-calibre ammunition is coated both on the inside and the outside for protection.

Type E—This lining is recommended for use in connection with hydrogenated edible oils. It is of the same general character as Type D, but is of an oleoresinous type of a somewhat lower quality, compounded primarily to meet requirements for a lower-priced product. It has been approved for hydrogenated oils and other edible products. Where competition is keen and the container is definitely a one-time shipper, there is a market for a lining of this type.

All of the aforementioned linings should be sprayed over carefully cleaned steel and then force-dried by an increasing heat from room temperature to 400 or 425° F. during a twenty-five minute cycle. When more than one coat is applied, only the final coat should be baked as above. Preliminary coats should be baked in the neighborhood of 250 to 275° F.

Following are charts indicating the type of linings recommended for individual products. The numerals indicate the number of protective coatings of each type that is required.

Animal and Vegetable—Oils and Fatty Acids

	Type A	Type B	Type C	Type D	Type E
ACL (Stearic Acid Chloride)	1	1	1		
ADM No. 100 Oil	1	1	1		
AM Coco (Fatty Acid Derivative)	1	1			
AM Coco B (Fatty Acid Derivative)	1	1			
AM 1181 (Fatty Acid Derivative)	1	1	1		
Castor Oil	1	1	1	1	1
Castor Oil Fatty Acids	1	2			
China Wood Oil	1	1	1	1	1
Essential Oils	1	1			
Fatty Acids of Drying Oils	1	2			
Fish Oil	1	1	1	1	1
Fish Oil Fatty Acids	1	2			
K-1170 (Fatty Acid Derivative)	1	1	1	1	
Linseed Oil	1	1	1	1	1
Linseed Oil Fatty Acids	1	2			
N Coco (Fatty Acid Derivative)	1	1	1		
Oleic Acid	1	2			
Perilla Oil	1	1	1	1	1
Pine Oil	1	1	1	1	1

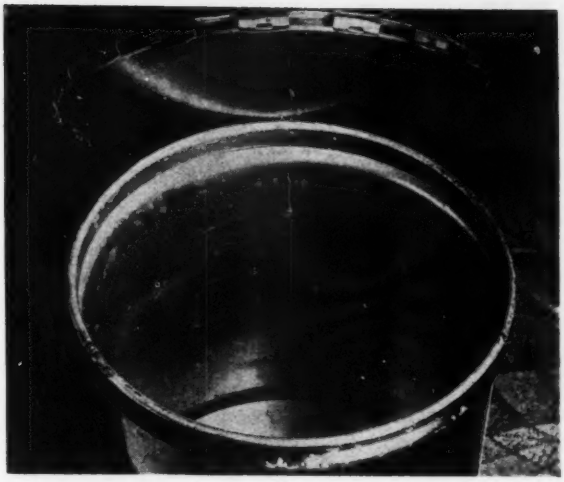
Products of Oil Refiners

	Type A	Type B	Type C	Type D	Type E
Base Oil "A"	1	1	1	1	1
Gasoline	1	1	1		
Grease (Lubricating)	1	1	1	1	1
Hydrogenated Naphtha	1	1	1	1	
Hydrocarbon Solvents	1	1	1	1	
Industrial Oils	1	1	1	1	1
Kerosene	1	1	1		
Lubricating Compounds	1	1	1	1	1
Lubricating Oils	1	1	1	1	1
Mineral Spirits	1	1	1	1	
Nujol	1	1	1	1	
Petroleum Ether	1	1	1		
Petroleum Jelly	1	1	1	1	
Petroleum Solvents	1	1	1	1	
Transformer Oils	1	1	1	1	

Food Products

	Type A	Type B	Type C	Type D	Type E
Amaizo (Edible Lactic Acid)	1				
Beer	1	2			
Butter	1	1	1	1	1
Cane Syrup	1	1	1	1	1
Caramel Coloring	1	1	1	1	1
Chocolate Drink Syrup	1	1			
Cola Concentrates	1	2			
Condensed Milk	1	2			

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4. A 5-gal. metal container with a resinous inner lining used to package drugs, chemicals, munitions and foods. Note the crimped closure here. Photo The Container Co.

Diamalt	1	2			
Evaporated Milk	1	2			
Hydrogenated Edible Oils	1	1	1	1	1
Karo Syrup	1	1	1	1	1
Lard	1	1	1	1	1
Margarines	1	1	1	1	1
Soft Drink Concentrates	1	1			
Sorghum Molasses	1	1			
Sugar Syrup	1	1	1	1	1
Vitamin Solution "B"	1	2			

Strong Solvents—Coal Tar and Miscellaneous

	Type A	Type B	Type C	Type D	Type E
Acetone	1	1	1		
Amyl Acetate	1	1	1		
Amyl Alcohol	1	1	1		
Ansol	1	1	1	1	
Benzol	1	1	1		
Butyl Acetate	1	1	1		
Butyl Alcohol	1	1	1	1	
Butyl Lactate	1	1			
Denatured Alcohol	1	1	1	1	
Dibutyl Phthalate	1	1	1		
Ether (Sulphuric)	1	1			
Ethyl Acetate	1	1			
Ethyl Alcohol	1	1	1	1	
Lacquer Thinners	1	1			
Lacquer (Nitro)	1	2			
Propylene Dichloride	1	1	1		
Toluol	1	1	1	1	
Tricresyl Phosphate	1	1	1	1	
Turpentine	1	2			
Xylos	1	1	1	1	

Miscellaneous

	Type A	Type B	Type C	Type D	Type E
Arcolene Soap (Dry Cleaning)	1	1			
Basic Casein Emulsion	1	2			
Formaldehyde (40% Aqueous)	1	2			
Green Oil Soap (40% Aqueous)	1	2			
Glycerin	1	1			
Lav-O-Let (Creosote)	1				
Magnesium Hydrate 30%	1	2			
Paint Products	1	2			
Putty Products	1	1			
No. 600 KOP Soap (Dry Cleaning)	1	2			
Sohio Soap	1	2			
Urea Formaldehyde Resins	1	1	1		
Varnish Products	1	2	1	1	
Witch Hazel	1	2			
Wood Pulp Lactic Acid	1	2			
Yellow Pulp Color	1				
Zinc Chloride (70%)	1	1			

XUM

Fibre drums

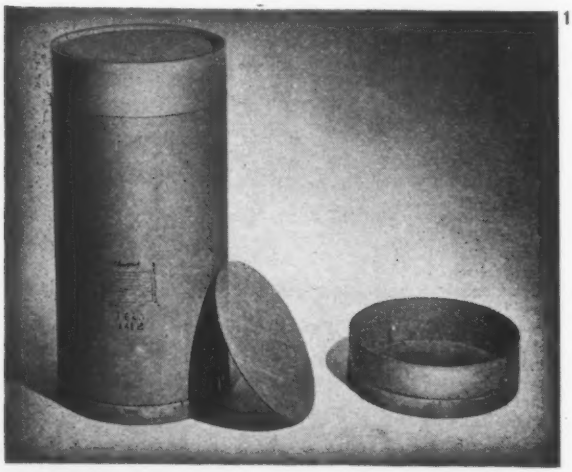
by R. W. Lahey

During the last two years, war demands have placed a heavy burden on fibre drum manufacturers. Government and industrial requirements have resulted in a rate of production far in excess of any previous expectations. But this was not all—replacements for metal containers were needed to hold liquids, solid poisons, solid inflammables, greases, hydrogenated oils and many other products difficult to pack. Each of these demands required changes in the prewar container of a more or less radical nature. A good example is the 5-gal. fibre container for oleoresinous paint. This required complete reconstruction of the heads, liners, etc., so that they could be made liquid-tight.

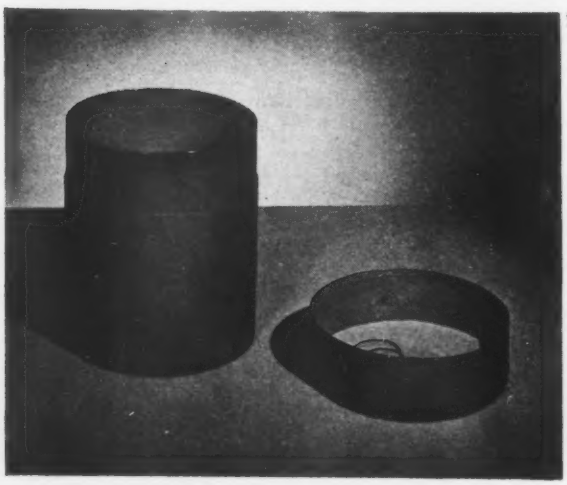
This industry has met the demands by offering drums for packing heavy liquids, greases, oils, inflammables, etc. Most of these containers are of the standard solid-fibre, convolutely wound construction. A few solid-fibre, spirally wound drums in the smaller sizes have been placed on the market. Most of these new developments have not been in service long enough to prove that they will successfully meet the many transportation abuses they must withstand. This is a very interesting, and at the same time, critical period for fibre drums. The success of present developments will probably have a great influence on the place which such containers will occupy in the postwar era. These accomplishments have been achieved in the face of certain prohibitions which have been placed on the use of such materials of construction as aluminum foil, pliofilm and the like, which were widely used in the prewar era for lining fibre drums.

Fibre drums are used to ship a large variety of products ranging from inexpensive asphalt—which is poured hot, directly into the drums and then solidified—to pharmaceutical products such as vitamins worth several hundred dollars and packed in one drum. The list is much too long to give, but some of the highlights are cyanides, sulfa drugs, explosives, many food products, etc.

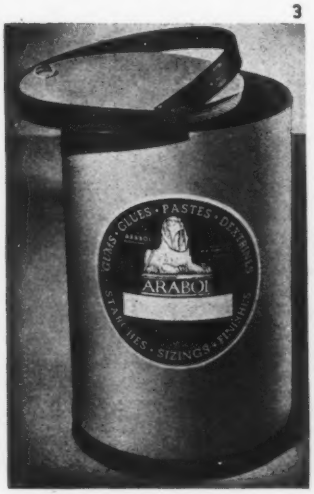
In the early part of 1943, the industry operated under WPB Order P-140 which assigned priority ratings according to the products to be packed in the containers. Under this system, manufacturers were literally swamped with orders until the situation became so acute that allocation Order M-313 was issued on May 21 and became effective on June 16, 1943. Allocations were originally made on a monthly basis, but this was later revised to a bimonthly system. Purchase orders placed with drum



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1. Vitamins for export are first packed in 5-gal., cellulose-acetate lined Fiberpak drums with protective, transparent, cellulose-acetate inner cover for view of product. 2. Outer Fiberpak drum holds two of above, has steel rolling chimes, holds $4,000 worth of vitamins. Photos The Container Co. 3. Laminated, convolutely wound drum has 1/4-in. kraft walls, wood top and bottom, metal-flange lock top, choice of coating. Photo Carpenter Container Corp. 4. Light, waterproof fibre drum for bulk shipping of dry products. Photo The Container Co.

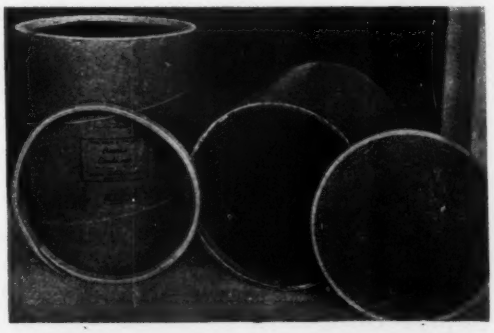
manufacturers must state the products which are to be packed in each type of drum ordered since this information must be transmitted to the WPB for allocation purposes. Order M-313 restricts fibre drum users to a maximum inventory of 60 days.

The shortage of these containers led some manufacturers to efforts to recapture drums from their customers. These used containers are cleaned and often minor repairs are made before they are re-used. If heads or closing rings are damaged, they can be replaced with new parts, obtainable from the drum manufacturers. This move has caused users to require customers to use care.

Like all other types of containers, fibre drums will give their best service when properly handled.

1. Drums should be moved by canting and rolling on their bottom chimes. Sidewalls, although adequate in strength, should be protected from puncture or crushing by sharp objects.
2. The best type of handling equipment is the four-wheeled dolly. Skids or pallets, transported by lift trucks, will not damage the drums. Two-wheel hand trucks are not recommended because of the danger of damaging sidewalls with the sharp lips of these trucks, although they will give satisfactory results for occasional handling.
3. Filled drums should never be dropped to the ground from the tail boards of motor trucks. They should be lowered on two or more skids, each of which is at least 4 in. wide. Narrow skids will cause excessive pressure on small areas of sidewalls which may cause distortion and shorten the life of these containers.
4. Certain precautions should be taken in bracing of carload and partial carload shipments to prevent gates or strapping from resting against the fibre sidewalls. All braces should rest against the top and bottom chimes. If braces cannot be located at these points, sidewalls should be protected by vertically placed wooden cleats which extend over the entire height of the drums. Drums should be packed tight from one end of the car to the other, in nested rows. Some constructions can be transported without bottom chimes riding up on sidewalls of adjacent drums, if every other row across the car is upended. Wooden bracing or steel bracing of the stationary or floating load systems will prove adequate if these precautions are followed.
5. Slings used in loading vessels should be of the platform, canvas or net type. Drafts should be built up in slings to prevent excessive pressure.
6. Drums should be stored on their bottoms in a dry place, under cover. They should be placed on dunnage if floors are wet. They may be tiered to

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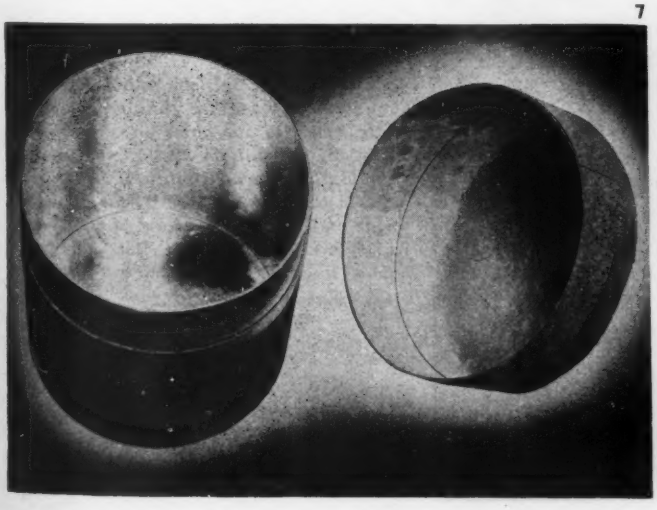


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5 and 6. War baby of fibre drum family uses same construction and materials as for concrete construction molds. Drums are made from long tubes—ordinarily used for the concrete mold—which are cut into suitable lengths and fitted with top and bottom as well as with an inner sleeve. 5. Shows outside and inside of container. Note construction of lid and the split ring. Photos Beacon Container Co. 7. Fiberpak drum for shipping chemicals and pharmaceutical products. It can also be adapted for shipping of greases or for use with semi-liquids. Photo The Container Co.

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any desired height with or without dunnage, provided the weights are not so great as to cause buckling of the sidewalls of the drums.

The Army Specifications No. 100–14A and Navy Specifications No. 39P16a, issued Feb. 15, 1943, contain fibre-drum specifications for overseas shipments which contain rigid requirements for fibre drums to meet. Among other particulars, an immersion test is prescribed. In the opinion of the writer, it is doubtful if any fibre drum manufacturer will guarantee that his drums will pass the immersion test which is fully described in these specifications.

Fibre drums now on the market

Ringseal Drum, Beacon Container Co.: It consists of a spiral-wound shell of 11 plies with an inner "A" flute-corrugated fibre sleeve. The ends of this sleeve are sealed with a ring washer which is held in place with glue. Each bottom and head is formed of an inner corrugated disc and two solid-fibre discs of different diameters glued and stapled together. These heads are held in place with hardwood split rings which are stitched to the shell with wire. The manufacturers claim that these containers comply with ICC Spec. 21B which is required for containers holding 5 gal. of inflammable paints.

Victoree Drum, California Stucco Products Co.: The maximum size is 5 gal. and has a spiral-wound sidewall of multiple plies. The two heads consist of several plies of fibreboard, glued together. The inner disc fits snugly inside the shell and the outer disc is flush with the outer periphery of the shell. Heads are attached with bias-woven cotton tape which is held in place with adhesive.

Carpenter Drum, Carpenter Container Corp.: Made in a large variety of sizes from a maximum 75 gal. down to 3/4-gal. minimum. It has a convolutely wound shell and wooden heads held in place with hinged metal rings which are locked with levers. This container complies with ICC 21A Specifications.

Economy Drum, Carpenter Container Corp.: Made in sizes from a maximum of 26 gal. to a minimum of 1 gal. It also has a convolutely wound shell. The fibre heads are shaped by drawing moist fibre discs under pressure. They are fastened to the shell by the use of gummed, bias-woven cambric tape.

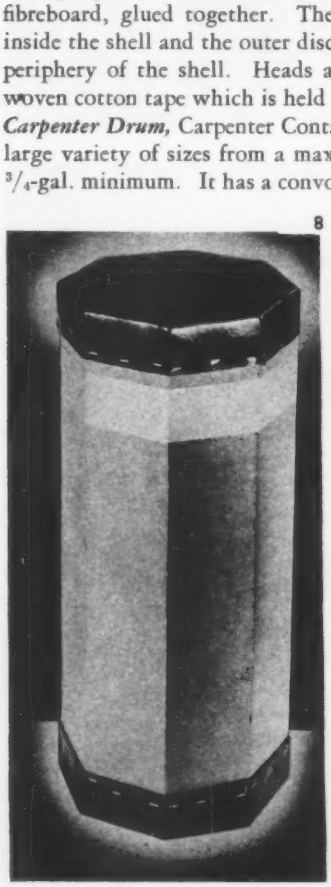
Leverpak Drum, The Container Co.: Fabricated in sizes of 24 to 75 gal. It has a convolutely wound shell. The bottom consists of a series of fibre trays, held in position with a galvanized steel band, applied with extreme pressure. The full-open head is steel, and it is held in position by an ingeniously designed and extremely efficient galvanized steel locking band. This drum complies with ICC 21A Specifications.

Fiberpak Drum, The Container Co.: Made in sizes from 3/4 to 67 gal. The shell is convolutely wound, one end flanged inward. The bottom is formed by attaching circular discs to the flange of the shell by stitching with wire. The larger sizes are supported with a galvanized hoop. A convolutely wound tube is inside this outer shell. The telescopic cover is formed in the same way as the bottom. The cover is sealed with two plies of 3-in. wide, 60-lb. kraft tape.

Stapak Drums, The Container Co.: Fabricated in sizes ranging from 2 to 32 gal. The shell is convolutely wound and the steel bottom is attached by wire stitching. The steel slip cover of this drum is held in place by means of metal sealing lugs which are attached to the sidewalls of the drum.

Keystone Drum, The Keystone Fibre Drum Co.: Made in sizes up to 70 gal. It consists of a convolutely wound shell to which two steel heads are double seamed, or a full-

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8. and 9. This self-contained corrugated container is used for shipping of chemicals. Due to its patented construction, the top and bottom are stapled, thereby eliminating the possibility of sifting. By means of bringing both of the outer sections of the container to a butt and then applying tape around the circumferance, no stress is placed on the tape.



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10. Drumpak fibreboard drums in various styles and sizes are equipped with steel straps which are sealed on top and bottom. Photo Gaylord Container Corp.
11. Easily assembled drum consists of a container within an outer shell made to form a nest for top and bottom. These in turn are held in place by a tray and six finger-shaped cut-outs. Photo Paramount Container Co.

open-head construction is available. One head contains a friction cover of any practical diameter which is held in place by channel clips or turnbuckles. When these drums are used for casting (pouring hot liquids which solidify on cooling) they are equipped with one bulged steel head. The purpose of this head is to allow filling with sufficient liquid to compensate for the shrinkage on solidification and thereby fill the entire cubic contents.

The Standard Drum, The Master Package Corp.: Fabricated in sizes of 1 to 55 gal., it has a convolutely wound fibre shell. The bottom discs are held by a galvanized steel hoop that is secured to the shell. The top of the shell contains a galvanized steel protective band. The slip cover is of the same construction as the bottom. The cover is held in place with metal clips.

The All-Fibre Drum, The Master Package Corp.: Sizes 1 to 55 gal., also has a convolutely wound shell. The bottom discs are held in place by a fibre bead which is attached to the inside periphery of the shell. The cover, which is of similar shape to the bottom, sets inside the shell on a narrow fibre bead. It is held in the drum with four metal clips which are attached to the outer sidewall.

Steel-fibre drums

Steel-fibre drums are made in 50- and 55-gal. sizes only, and are equipped with 6-, 9- and 14-in. friction-lid openings. The shell is convolutely wound and has steel heads. These heads, of 24- to 28-gauge steel, are crimped to the fibre shells, the ends of which are doubled over and glued. This increased thickness provides a more secure anchor for the heads. It also extends the chimes beyond the plane of the sidewall, thereby providing rolling hoops when moved on smooth surfaces. Openings are of the friction type with diameters up to 12 in.

Hexagonal octagonal fibre containers

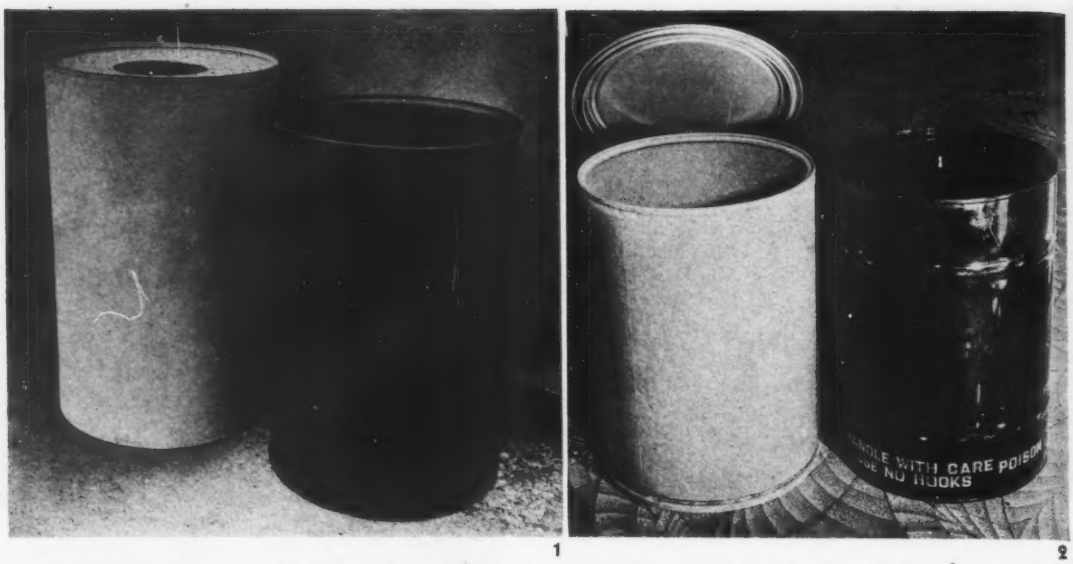
Closely related to fibre drums, are hexagonal and octagonal fibre containers of special constructions. They are used for transporting powdered and briquetted materials. Heavy viscous paints are packed in one type. Following is a brief description of the principal containers:

Drumpak Container, Gaylord Container Corp.: Octagonal in shape and fabricated from high-test corrugated board. The side seam of the shell is formed as in a fibre box, by wire stitching or with extra-heavy, 3-in. width cambric tape. Heads are interlocked with the cylinder, somewhat like the double seam of steel drums. These cover flaps are notched, forming a slight recess for the steel strapping which secures the heads to the shells. A specially designed dispensing head is available. These containers are shipped knocked down.

The Atlanta Container Co. manufactures an octagonal container of corrugated board. It consists of two shells, one within another. The bottom is formed by extending the flanges of the head up over the sidewalls and securing by wire stitching. The telescopic cover is of the same construction as the bottom, is secured by gummed tape.

The Paramount Container Co. has recently announced a 5-gal. container to hold liquid paints. It is fabricated from corrugated board and is hexagonal in shape. There is an inner and an outer shell. The inner shell forms a shelf for the top and bottom discs and trays. Six finger-shaped cut-outs at the ends of the outer shell lock these head assemblies securely to the body of the container. The containers are shipped knocked down and are assembled by the user. They are built to meet ICC Spec. 12L which is approved for transporting 5 gal. of inflammable paint, flashing between 20 and 80 deg. F.

XUM



1 2

1. When used for greases, the fibre-bodied drum, which has metal ends and coated interior (left), can replace the all-metal drum (right). Photo Texas Oil Co. 2. The 30-gal. fibre drum (left) replaces steel container (right), is suitable for inflammable solids, oxidizing materials and Class B poisons. Photo The Container Co.

Linings for fibre drums

by Elon R. Brown

Manufacturers of fibre containers are nowadays being deluged by requests to develop containers for many types of materials which were formerly packed in metal containers. As has been already noted, considerable progress has been made in the research and development of special linings and outside coatings for metal containers to insure non-toxic and non-corrosive effects on the materials packaged.

Today the fibre container industry is developing and perfecting various substances to give the same protection to many types of materials formerly packaged in metal containers, through the use of various chemical linings, adhesives, laminants and sealers, and by the use of various types of paper, in combinations of one or more layers, in order to make the fibre container equal to the metal container in durability and protective qualities.

The fibre containers discussed here are of two types—the canister, or small package, and the drum, or bulk package. The problems for both types of fibre containers are very similar in regard to laminants, sealers and impregnations used in their construction. For this reason the discussion will be handled as a unit.

Fibre containers for peacetime uses

Before the war brought additional problems, fibre containers were manufactured for many peacetime uses, principally for products that required maximum protection against contamination and, in some cases, required a waterproof package. These types of packages, because of their inexpensive construction, had been manufactured for some time and were more than satisfactory. They were used principally for dry materials, including molding powders, pharmaceutical chemicals, rubber accelerators, cleaning powders, poisonous insecticides, inflammable solids, C.P. chemicals, etc. The food industry has adopted the fibre drum for bulk shipments of ground coffee, cocoa, spice, powdered milk, powdered eggs, baking powder, salted nuts, certain grades of meats and fresh fruits. Fibre drums also provided adequate protection for rolls of transparent wrappings, sheetings and fabrics.

Most of these containers consisted of spiral wound or convolutely wound sides with metal closures on each end. A few, however, were made of all fibre and used to package certain pharmaceutical chemicals, foodstuffs and specialties such as ice cream. These materials were packaged without the use of metal because of the possibility of contamination. With the increased demand for metal for war use, pressure has been brought on the manufacturer to develop containers using no metals.

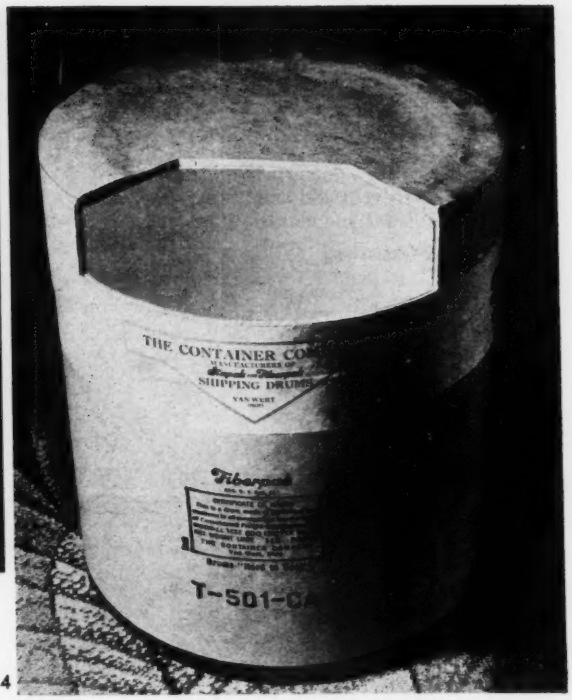
Fibre containers for today's demands

Fibre container manufacturers, in addition to overcoming the handicaps caused by the metal shortage, have been called upon to package materials heretofore considered impossible to package in any other than an all-metal container, and such fibre containers are now being used on materials actually going to the fighting front.

Bleaching powder compounds are being packaged in waterproof and moisture-vaporproof containers made of ordinary chip board and kraft paper, using an asphalt or an asphaltic compound as a laminant together with a waterproof, chemically resistant laminant. This bleach-



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3. Drum with wax-impregnated kraft paper disc and metal-band closure. 4. 5-gal. all-fibre drum with cellulose acetate inner lining and asphalt-barrier board: for munitions, chemicals, foods, drugs. Photos The Container Co.

ing powder is used to refill decontamination cans and serves the same purpose as the all-metal bleach drum.

20-millimeter shell cases consist of an elongated tube and are manufactured in much the same way, using the same laminants. This type of container is used to store the shells before actual use. These shells must be protected from water and moisture-vapor in order to insure maximum effectiveness when used.

Other war materials such as tetrol, DNT, guanadine nitrate and smokeless powder are also packaged in fibre.

Foodstuffs for our armed forces and the Lend-Lease program are also being packaged in fibre containers that have been specifically designed for bulk shipments of perishable goods. These containers also must have particular laminants. Fillers, sealers and linings must be tasteless, odorless, waterproof and moisture-vaporproof. For these shipments of dry materials, special laminants are used and combined with a particularly water-impervious vegetable parchment paper, or it may be necessary to use materials such as cellophane, glassine or a rubber hydrochloride sheeting.

Some of the strategic materials formerly packaged in steel are potassium permanganate, molybdenum, synthetic rubber, vinyl resins, polystyrene, phenolic resins, urea resins, photochemicals, chlorate of lime, organic and inorganic dry colors, dyestuffs (dry), powdered magnesium, shellac (dry), *lithopone*, gelatin, X-ray films.

Fibre containers, some all fibre and some with metal ends, have been adapted to package materials like calcium cyanide, sodium cyanide and sodium hydrosulphate, all of which, when exposed to moisture, give off a poisonous gas. For the packaging of the more active chemicals, a chemically resistant, waterproof and moisture-vaporproof laminant has been developed that gives maximum protection. Fibre drums have been made moisture-vaporproof by the use of a so-called "asphalt barrier-board." In other words, the drums use an asphalt or asphaltic compound as a laminant and have a resinous varnish (phenolic and urea) on the outside of the drum to make it more weatherproof.

Great strides have been taken in the progress of fibre containers. For instance, viscous materials such as jams, icings, fondants and various types of viscous mixes are now being packaged in fibre drums. For this type of package, rubber hydrochloride was used for the inner laminant. While this material is now unattainable, very good results have been obtained by the use of a cellulose acetate and an asphalt or asphaltic compound for a laminant. Aluminum foil was formerly used for some corrosive materials, but, at present, a silicate spray, cellulose acetate or glassine on the interior of the fibre container has been found to be satisfactory in a great many cases.

Fibre containers have recently been found satisfactory for holding hot liquids which solidify upon cooling, such as rosins, resins, waxes, asphalt, etc.

The packaging problem is, of course, complicated by the scarcity of material and affects not only the metal container but also a great many of the materials and compounds formerly used in the manufacture of fibre containers. Such standbys as waxes, animal glues and asphalt are increasingly hard to obtain.

This problem has called for a great deal of research on the part of fibre container manufacturers, manufacturers of protective coatings and allied interests, together with the fact that manufacturers in other lines of business are turning to fibre containers in the hope that they will be able to solve their packaging difficulties.

Each product brings up a specific problem. For ex-

XUM

LAMINANTS AND ADHESIVES
WATER-SOLUBLE Silicates, Vegetable Glues, Animal Glues
WATER-INSOLUBLE Waxes Asphalts Lacquers—solvent and emulsion types Resins—solvent and emulsion types
CHEMICALLY-RESISTANT Resins
LININGS
CHEMICALS (SOLVENT AND EMULSION TYPES) Vinyl Resins Phenol-formaldehyde Oleoresinous Varnishes Lacquers Silicates
THERMOPLASTICS (HOT MELTS) Waxes Paraffins Resins
FABRICATED MATERIALS Vegetable Parchments Greaseproof Papers Metal Foils Cellophane Rubber Hydrochloride Cellulose Acetate Ethyl Cellulose Glassine
SEALERS
Miscellaneous Cements, Rubber Compounds Asphalt Cements, Resinous Cements Pyroxylin Cements

ample, a good percentage of milk today is packaged in fibre containers that have been dipped in waxy solutions which have been developed for milk only. Confections, such as cookies formerly packed in tins, are now packaged in cylindrical fibre containers.

Laminants

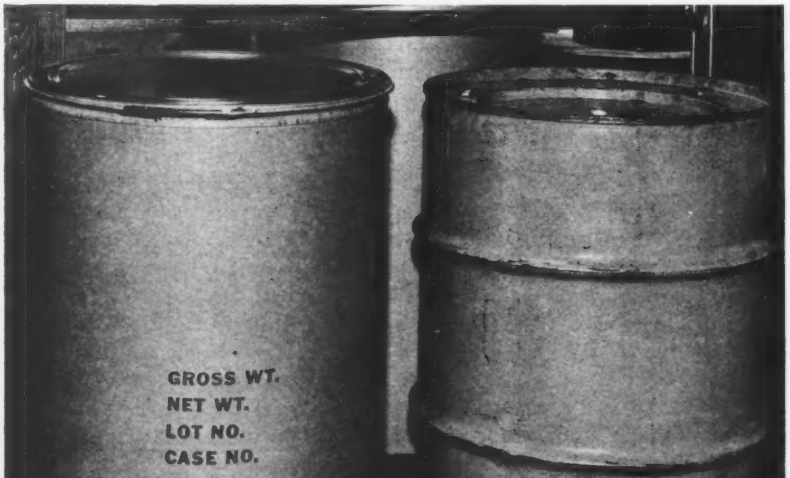
The laminants in these containers must accomplish the following things: They must be non-toxic, have no odor which will be transmitted to the food and they must be moisture-vaporproof in order to preserve the freshness of the food. A special laminant has been developed to make the all-fibre container remarkably efficient as a substitute for the former container made of metal.

Sealers

Sealers must be waterproof, moisture-vaporproof and have high adhesive qualities. In some cases, sealers must be greaseproof, odorless and tasteless. These specifications depend on the type of material packaged, as well as the ultimate use.

Some fibre containers are sealed with the regular laminant used in the manufacture of the container, using a water-soluble sealer, such as silicate of soda, for ordinary uses. A resinous adhesive is used for containers that are to be waterproof and moisture-vaporproof. After this is done, the ends of the container may be dipped in a mixture of resin and wax. On the open end of the container a sealing disc is used to insure complete closure. This disc is usually made of kraft paper, impregnated with wax.

The table at the left lists some of the adhesive and protective materials which are used in the manufacture of fibre containers.



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5. Fibre drum with asphalt barrier-board interior construction is shown here with the metal drum it replaces. It may be fabricated with an inner lining of paraffin, cellulose acetate, glassine or vinylite. Capacity is 24 to 75 gal. Photo The Container Co.

Wood barrels & drums



1. Wood barrel should be rolled on its "bilge," thus, and never end-over-end. Photo Socony-Vacuum Oil Co., Inc.

During the critical early days of the war, wood barrels had an emergency job to do, and these traditional containers were most useful in delivering the goods when the steel shortage was so critical that there simply wasn't enough of it to make the required number of metal drums. Though the steel situation is easier at present, the wooden barrel is still very much in service despite the fact that a 50-gal. wooden barrel weighs 72 lbs. as against 51 lbs. for a 55-gal., 18-gauge steel barrel, and despite the fact that the wooden containers are slightly more costly and require more shipping space.

The wooden barrel goes back to the ancient Roman times when, of course, it was strictly hand made. Today its machine-made successor is very little different. There is a shortage of skilled labor in the cooperage trade, as well as a lack of cured wood ready for staves. Estimates in the cooperage industry indicate a possible production of 6,000,000 barrels a year. If labor and lumber are provided, and if steel hoops are permitted, production might be stepped up to 15,000,000 as the possible output of the some 350 makers of barrels, kegs, tubs and hogsheads in the United States.

Though the structure of the modern barrel remains the same, improvements have taken place in the use of linings and coatings. One consists of a weatherproof coating with an asphalt base, which, it is claimed, will withstand heat, cold, dryness and moisture without causing swelling or shrinking of the wood, slacking of the hoops, warping of heads or opening of joints. It is recommended for export shipments.

Another modern touch provides barrels with metal flanges and plugs, one 2-in. and one $^3/_4$-in. in one head of each barrel. These make it possible to siphon out the contents by the same method as used with steel drums, thus making the wooden barrel more adaptable for reuse. It is possible to vary the inside coatings so that different contents may be carried.

How to handle wood barrels

The revival of cooperage means that American shippers must learn all over again how to use barrels—particularly essential now in view of the shortages which necessitate longer life for all containers. Pointers for the handling of barrels include the following:

1. Roll the barrel on its "bilge" or side, never roll it "hand-over-hand" on end.
2. "Ease" barrels gently down the skids.
3. Avoid rough handling—wood can't take it as steel can.
4. Don't expose barrels too long to the sun—they'll dry and shrink.
5. Barrels should not be stacked tier on tier.
6. Use hooks carefully.
7. In loading for export shipment, use chime hooks or rope slings, not loading nets.

2. Wood carried Lend-Lease aid. Barrels of powdered eggs from Texas on the Liverpool docks. Photo Wide World.



Wood boxes

THREE general types of wooden boxes and crates are utilized as shipping containers. The types are sawn wooden boxes, plywood boxes and wirebound boxes. Although available in hundreds of sizes and weights to accommodate products ranging in size from pencil leads to bombing planes, wooden boxes made from sawn lumber are all classified under seven distinct headings known as Styles 1, 2, 2½, 3, 4, 5 and 6. The box styles are illustrated opposite and a brief description of each follows.

The Style 1 box, simplest of all, is adaptable to many types of products, with 60 lbs. as a reasonable weight limit. Boxes of this type consist of a single thickness of lumber made from one or more pieces of wood, with sides, top and bottom nailed to the ends. Top and bottom boards are nailed to the side grain of the ends and the side boards are nailed to the end grain of the ends.

In Styles 2, 2½ and 3, each end is strengthened with four cleats. The ends are thus reinforced against splitting and the sides are strengthened by the greater holding power of nails driven into the side grain of the vertical cleats. For gross weights of more than 200 lbs. and for large containers such as are used for textiles, these styles are commonly used.

The Style 4 box is designed to carry loads up to 200 lbs. and to withstand severe handling. The two heavy cleats at each end of the box will strengthen the ends against splitting, provide side-grain nailing for the sides and help to take the thrust if the box is dropped.

When the question of storage space makes desirable a reduction in the outside length of the package and when the shape of the contents is such as to leave space in the corners of the box, cleats are placed on the inside to form the No. 5 box. Cleats may be square or triangular.

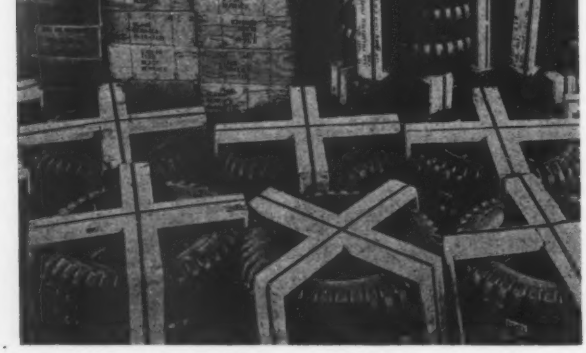
Style 6 boxes, with lock-corners, are often used when tight, rigid packages are required. Weights carried usually range from 10 to 150 lbs. Lock-corner boxes are of particular value for products that are subject to sifting or where maximum rigidity is required.

In selecting any one of the seven styles of boxes, a shipper may be influenced to some extent by the comparative initial cost, without giving due consideration to other important factors. In general, Style 3 boxes cost the most and Style 1 boxes the least. Although the difference in cost is not great, there is a big difference in the performance of the several styles of boxes.

The distance the box must travel and the transportation facilities to be used, will appreciably affect the design, as will the use of reinforcing metal straps or wire. Although there is an impression among shippers that lighter containers may be used for carload shipments, it should be remembered that, except in rare instances, every container may move in less-than-carload traffic.

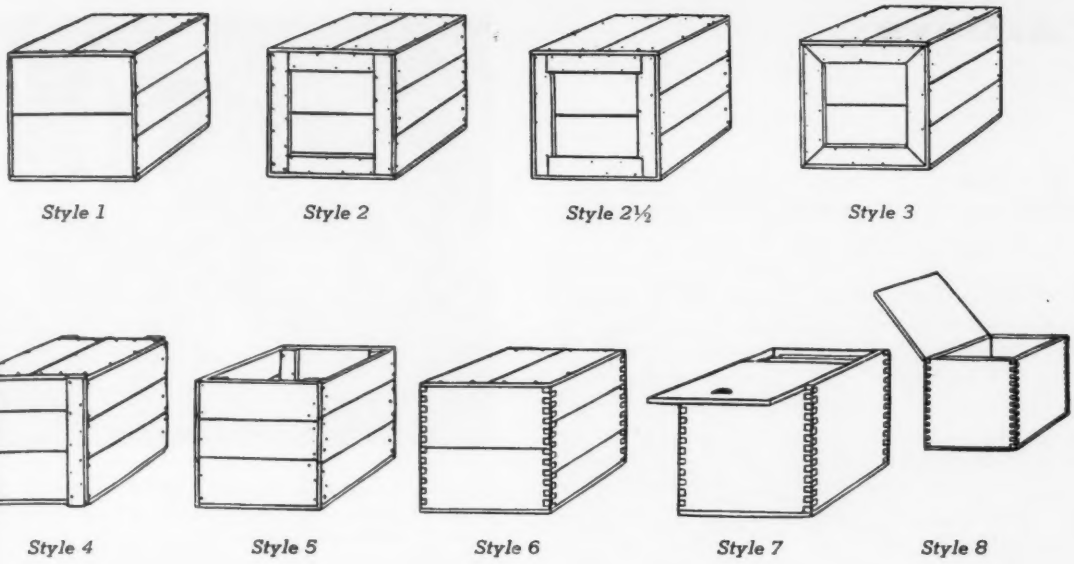
1. Rubber tires are crated in this criss-cross fashion. Four tires are crated together for shipment, steel strapping affords still further protection. 2. Many food products are given the protection of wooden wire-bound or steel-strapped boxes for wartime transport. These boxes are stacked on the deck of a U.S. warship before storage in the hold. Photo U. S. Navy.

1



2





Style 1: Nailed wooden box; uncleated ends, sides held by end-grain nailing. Style 2: Nailed wooden box; the double-cleated ends eliminate weaknesses found in Styles 1, 4, and 5. Styles 2½ and 3: Variations of the Style 2 box. Style 4: Nailed wooden box; it has outside cleats. Style 5: Nailed wooden box which has inside cleats. Style 6: Lock-corner box with cover and bottom which are held in place by nailing. Styles 7 and 8: These are variations of Style 6 box.

Boxes rigidly constructed from sawn lumber, in itself tough and hard, offer a high degree of protection against cutting, puncturing and abrasion. Wooden boxes may be stacked without special braces and cars or trucks may be completely filled. Warehouse charges, usually figured on the basis of floor space occupied, can frequently be cut by high piling, without damage to containers.

Wooden boxes provide a difficult barrier for sneak thieves and offer protection against rodent attack. Not being affected readily by moisture or humidity changes, wooden boxes, when properly packed, often protect their contents from rain or snow for considerable periods.

Plywood boxes

The thickness of material does not alone determine strength. Plywood is an improvement upon nature—made by the gluing together and crossing of the grains of two or more pieces of thin wood, called veneer. Plywood, weight for weight, is stronger than other materials and this light, strong material is reinforced with sawn lumber cleats in a number of ways to produce the standard styles illustrated. For many uses, special styles are needed and these are scientifically designed to meet conditions. Each commodity presents a separate problem, so that various thicknesses of plywood and sizes of cleats are used. Often, unless shipping experience is available, laboratory or other tests to determine correct construction are necessary.

Plywood box parts are all one-piece, this being one of the factors accounting for the great strength, the light weight and the protection against dirt and pilferage, making assembly of the shooks very simple and economical and insuring that all shooks received can be assembled without loss.

For many commodities, internal bracing is necessary and the one-piece construction of plywood boxes is such as to add strength to this bracing and often makes possible a simplification not attainable where like rigidity is not supplied.

Thickness of plywood used varies from $^{3}/_{24}$ in. to $^{5}/_{16}$ in. in 3-ply and, for very heavy or export work, 5-ply as thick as $^{1}/_{2}$ in. is at times used. The cleats most generally used are $1^{1}/_{2}$ in., 2 in. and $2^{1}/_{2}$ in. in width and $^{5}/_{8}$ in. or $^{13}/_{16}$ in. in thickness.

Sizes range from those made to carry very small articles to those 200 in. or more in length, many of which carry extraordinary weights.

Crating

Crates are frequently used for the transportation of a wide number of articles. For many uses, special styles are needed and these are scientifically designed to meet conditions.

In all instances, however, the crate must be big enough to enclose entirely the article or articles and no parts must protrude. Also a space of at least one inch must be provided between all finished surfaces and the inside of the crate. The merchandise packed within must be blocked, braced or fastened so that it cannot move around inside the crate.

Selection of lumber, nails and type of construction will depend largely upon the merchandise to be crated, whether or not the product is to be stored for some length of time, whether it is to move to a hot, humid destination from a cold, dry temperature or vice versa and whether it is going to move by water as well as by rail.

The Freight Container Bureau, 30 Vesey St., New York, has issued Bulletin 6 on the essentials of crating.

Carboys

by W. A. Kerr

A carboy is a large glass bottle enclosed in a wooden box, the protective packing medium usually being cork in one form or another, though sometimes rubber blocks or salt-hay packing is used. The three component parts—the bottle, box and packing—are together known as the carboy. Carboys in one form or another have been used to transport acid since the very inception of corrosive liquids. They have proved in more recent years to be most satisfactory for shipments of inflammable liquids.

At one time carboys were available in capacities ranging from 10 to 15 gal., the most popular in the last decade being the 12- and 13-gal. sizes.

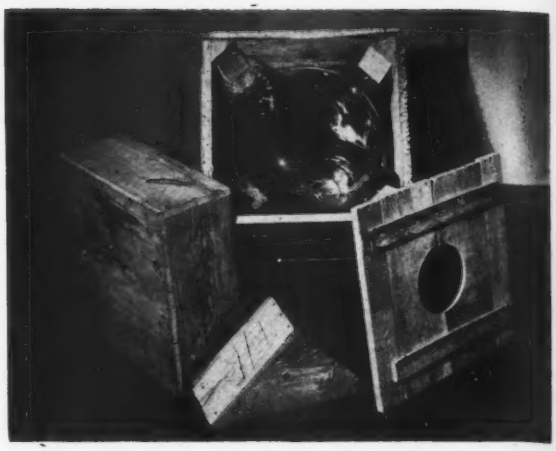
The manufacture of large carboy bottles involves no simple production problem. The bottles are so large, the quantities in demand so small, that it would not be economically sound to produce them by automatic machinery. The glass is hand gathered and partially formed, then finally blown in an iron mould. The blowers must be highly skilled, and comparatively few have had such training. Slow cooling is necessary to prevent stresses and strains. Therefore, after forming, the bottles are placed in ovens or leers where the temperature is gradually reduced to relieve this condition.

All bottles are thoroughly inspected and tested before they leave the manufacturer's plant. The carboys are first tested by vision tests and then by striking with a small steel rod to reveal to the tester, by the sound of the reporting ring, the distribution of the glass.

Numerous carboy users have, over a period of years, utilized their own special type or capacity carboys. Some lent themselves well to production, some poorly. In an effort to standardize the use of carboys and increase production with the same amount of available skilled labor, and also to create a stronger bottle, the Manufacturing Chemists' Association, through its carboy committee, conducted an investigation on carboy bottles. These tests were carried on through the cooperation of the Massachusetts Institute of Technology and the Gayner Glass Works, Inc.

The result of these tests was the development of the present 13-gal. M.C.A. standard carboy, with few exceptions, the universal carboy bottle today. A few 12-gal. carboys of the same general shape as the 13-gal. M.C.A. standard are still being manufactured, but for replacement in existing boxes only. This standardization has proved especially good in the face of the demands World War II has placed upon the chemical industry.

It would be difficult to estimate the average life of carboys because of the many types of boxes and packing material, the widely differing services they are called upon to render, and the treatment they receive from shippers and handlers. It is, however, estimated by the industry that the average life of a carboy bottle is approximately ten years. The average life of a carboy box is approximately four years, and of the packing—depending upon the type—from one to three years.



Carboy packages for corrosive and inflammable liquids comprise three parts—the standard 13-gal. glass bottle, the cork, rubber-block or salt-hay protective packing, and the strong wooden box. Photo Gayner Glass Works, Inc.

The value of the bottle represents about 55 to 60 per cent of the cost, the box about 25 per cent and the packing 15 to 20 per cent. It is therefore most logical that care be exercised in the production and handling of the bottle, and any extra protection which can be given to extend its life is economically sound. This fact must be considered along with the repair and upkeep costs, because it is the deciding factor in determining the type carboy to be used.

Every complete carboy package, before being put to use in the trade, must have imprinted on the side of the box the letters "I.C.C." (Interstate Commerce Commission) followed by the specification number applying to the particular purpose to which the carboy is assigned. Underneath these two groups of letters the symbol (assigned by I.C.C.) of the assembler must appear.

In an effort to avert breakage of carboys in transit and establish a standard to which all carboys must comply, the Bureau of Explosives set up a standard swing test which simulates the shock a carload of carboys going at a speed of six miles per hour would receive should it bump into a stationary object. Semi-annual tests are required, and random selection from stocks are subjected to these tests wherein the carboy is filled with water and set in a cradle attached to a 14-ft. pendulum at the base of which is a large concrete block. In order to comply with present regulations for shipments of dangerous liquids, 90 per cent of all carboys tested must withstand swing tests up to 55 in. when striking the concrete abutment on both side and bottom. Of course, all approved packages will stand this test.

Prepacking

by Paul Meelfeld

Economy in selling and greater customer good will are parallel objectives. That neither can safely be achieved at the expense of the other, has long been axiomatic as far as packaging is concerned. Any development which promises both objectives is looked upon with interest by manufacturer and retailer alike, and this accounts for the increased attention which is now being given to prepacking.

Prepacking is a process as simple as the name indicates, yet it has already proved its value not only in achieving greater efficiency, but in building greater customer good will.

One packing operation

Prepacking cuts packaging operations right down to one. When the product leaves the manufacturer, it is packed in the same carton that will take it into the consumer's home. Retail sales are made from samples on display.

An immediate question is the matter of cost. Prepacking does cost more than bulk packing, but its proponents argue that this increased cost is more than offset by the saving in time and breakage and by greater consumer good will.

At this point it may also be noted that prepacking is more than merely unit packing: it is factory packing designed to provide the most efficient packaging service which satisfies the needs of manufacturer, retailer and consumer.

The manufacturer's gain

The manufacturer's chief gain in prepacking is the fact that he can depend upon his product getting to the consumer in first-class condition. Too often has the manufacturer received the blame for damaged goods when he was not directly at fault, and almost always does con-

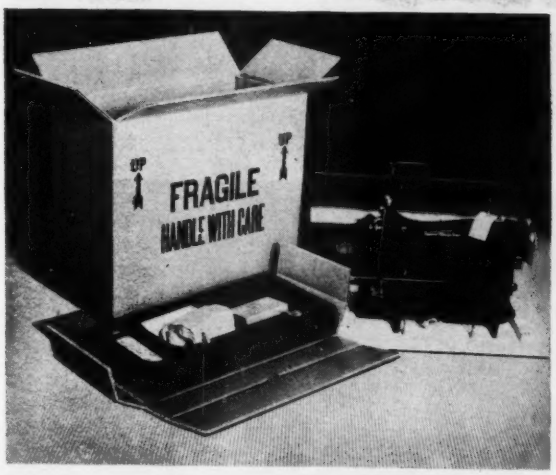
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1. China and glassware sets prepacked to facilitate handling. 2. Variety items in prepack display boxes catch the eye. 3. Fitting box to job pays off with 10 per cent weight reduction, 33 per cent time saving, 15 per cent reduction in original packing cost. 4. Furniture prepacked saves 20 per cent in first packing cost, 30 per cent in shipping space, 20 per cent in damage to the object. Photos The Hinde & Dauch Paper Co.



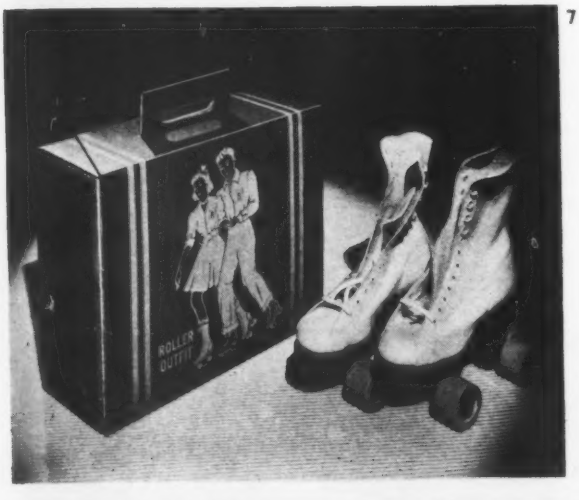
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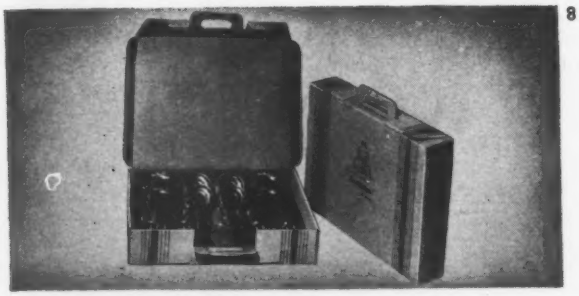
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5. Hard-to-handle items sell better if packaged for easy handling by the customers. 6. Products with delicate mechanisms are safely delivered in prepack boxes engineered for complete product protection. 7. This prepack is used by the customer, was engineered for economical display and is ready to go when the sale is made. 8. A fine product such as silver needs an attractive package and this one saves 40 per cent in package weight and 50 per cent in handling time. 9. Embossed corrugated gift box for related items holds them securely and neatly, is attractive and practical. Photos The Hinde & Dauch Paper Co.

sumer ill will of this sort react against further purchases of the same brand. Then, too, manufacturers using prepacking save much time otherwise spent in making adjustments with carriers for damage to incorrectly packed goods in transit.

The retailer's gain

The retailer also gains on two counts from prepacking. He benefits from the greater customer satisfaction just as the manufacturer does. His most direct financial gain, however, is in the fact that prepacking greatly simplifies the work of his own packaging department. Prepacked goods require very little handling time and few, if any, materials. This is a manpower saving that cuts general overhead as well.

Then, too, with prepacked items the retailer need not be faced with the packaging losses that are almost certain to occur when inexperienced workers—during rush periods, for example—are given the task of packaging fragile and costly products.

The customer's gain

The customer, of course, is the one to ultimately benefit from prepacking, although he perhaps is the one least conscious of its virtues. Customer satisfaction is less eloquent than dissatisfaction, but it certainly represents one instance where "silence is golden." The prepacked product which reaches the customer in first-class condition may well be the first step leading to subsequent buying moves which will bring him back to the same store and make him ask again for the same manufacturer's products.



1. Steel strapping is reduced to a semi-automatic operation in which women operators, even with little previous experience, develop a high degree of skill. Ration packs are "bound to get there" with steel bands rigidly mounted to standards adjacent to the conveyor system. Photo Acme Steel Co.

Steel & fibre strapping

by V. C. Hogren

War has forcibly impressed upon industry the importance of problems which exist beyond the production line. In days of peace, an improperly packed or reinforced shipment resulted in the filing of a damage claim and perhaps an interchange of a few letters. Carriers paid the claims and commerce went on as before. Today, shipments which are damaged in transit may mean the needless loss of lives of Allied soldiers, a lost battle, lost critical material and man hours of labor. Hence the emphasis on "pack it right to reach the fight."

Packing specifications of the armed services have been revised to meet the unusual situations found in loading and in unloading cargo at arctic and tropical bases, many without docks and without proper handling facilities. Ration packs, food, ammunition, planes, tanks and the thousands of other items needed for long campaigns, *must* arrive safely.

And in packing, space must be conserved to permit maximum loading with our limited transportation facilities. This too, has focused attention on shipping practices. From this war will come lessons to be used in the packing of the multitude of peacetime products (for domestic and export delivery) which may soon roll from America's production lines.

Lighter containers made stronger, bundling to eliminate outer wraps, skid and pallet loading and the bracing of carload ladings are the principal developments in which flat steel bands have participated. Packing operations are speeded up and will be more so as faster strap-applying equipment becomes universally employed. Unloading, too, will be faster as the mere snipping of the steel bands prepares the loads for the receivers. Thus, handling costs will be lowered, an important factor in postwar competition.

Manufacturers, whose new or prewar products will again appear in the market places, should prepare now to devise packing methods which will deliver their products safely and economically. Safely, because properly packed shipments will make friends at home and abroad. Economically, to capture or share markets which other American and foreign producers will strive to hold.

Besides its function in reinforcement, steel strapping often reduces shipping costs by permitting the use of lighter, less expensive containers. It speeds up the handling of materials by making skid-shipping practical, safe, and economical.

Strapping also permits the baling of many items—notably textiles—which conserves valuable shipping and storage space yet fully protects the commodity. The use of strapping to brace carload freight has directly lessened claims for damages, cut freight bills by reducing dunnage, and speeded up and simplified loading and unloading operations.

The value of reinforcing a shipping pack with steel strapping has long been recognized by the U. S. Government, whose Federal Standard Stock Catalog includes



2. Canned foods packed in steel-strapped fibre containers with Victory model coil holder. Photo Acme Steel Co.

strapping as an integral part of the packing specifications for a number of commodities. Specifications QQ-S-781, 42-S-11 and NN-B-621A cover strapping as required by the various branches of the Federal Government.

Types of strapping

Steel strapping is available in two types, nailed and nailless.

Nailed strapping necessarily confined to wooden packages, is held in place (usually at the extreme ends of a box) with nails. Since the application of nailed strap can seldom maintain the speed required in modern shipping rooms, the use of it is diminishing except for export packs and to reinforce boxes of bottles, lugs, tote boxes, etc. Strapping to be nailed is usually annealed (soft) to facilitate nailing—although some kinds are furnished with nail holes already punched. (See Table No. 1.)

Nailless strapping developed rapidly in recent years as improved equipment has accelerated the operation to keep pace with fast moving production lines. The strapping is first pulled tight around a package and the two ends are joined together with a metal seal. Separate hand tools (stretcher and sealer) and a one-piece, automatic device to tighten, seal, and cut the strap speedily are available for every type of shipping pack from parcel post to carload ladings.

Proper application requires that the tension on the strapping be sufficient to cut the corners or edges of the box slightly. Straps should always be applied at right angles to the edges of the pack so that the reinforcement will sit squarely on the box.

Nailless strapping is ordinarily furnished in coils weighing from 60 to 100 lbs. each; coils of measured length and cut lengths are also available for special applications. The black painted or lacquered finish is the most widely employed although zinc coated (galvanized) is preferred by some shippers especially for export or where the packages are stored for long periods of time. (See Table No. 2.)

Wooden boxes

Based on literally thousands of tests conducted by the Forest Products Laboratory (U. S. Department of Agriculture) at Madison, Wisconsin, the thickness of lumber for the top, bottom, and sides of a nailed wooden box can be safely reduced 20 per cent to 40 per cent when the package is properly strapped. (See Table No. 3.)

Suggested sizes of steel strapping for various gross weights of packed containers are given in Table No. 4. These recommendations are not arbitrary because the nature of the product, method of handling, internal packing requirements, kind and grade of lumber used, nailing, and construction are important factors which must also be considered.

A single strap should be placed around the middle of the box. When two straps are employed, each should be one-sixth of the length of the box from the ends. With three straps, the outer two should be at the same distance and the third at the middle. Three or more straps are suggested for relatively long packages.

A recent popular development is the strapping of wooden containers to hold the cover in place without the use of nails. To open the package, receivers merely snip the straps. As the cover is intact, such boxes can be re-used for shipping or storage.

Wooden crates

Steel strapping is valuable to keep the several parts of a crate in position and add the strength needed to withstand abuse in transit. As is the case with wooden boxes, the thickness of the lumber in a crate can usually be safely reduced. Whenever possible the straps should be applied around the short dimensions of the crate, over the slats. As an extra precaution U-shaped staples are sometimes nailed into the cleats over the bands.

Steel strapping is also used to brace products within crates to prevent internal shifting. Cartons holding the separate parts are sometimes strapped to the bottom or sides of crates containing stoves, machinery, washers, etc.

Cartons

By providing a greater margin of safety, steel strapping often permits the use of fibre and corrugated containers for products that would otherwise have to be packed in more expensive packages.

Many items, particularly textiles, can be shipped in "overloaded" cartons at lower freight rates when steel

strapping is employed. For data on specific products, consult the Consolidated Freight Classification.

Two or more cartons can be strapped into conveniently handled units, which prevents individual packages from being lost. Only one shipping label is required.

The Express Classification requires that packages weighing less than ten pounds be charged at the rate for that weight, but if two or more such packages are strapped into a single unit for one consignee, the rate is based on the aggregate weight. For example, three 9-lb. packages shipped individually would be billed at the express rate for 10 lbs. each or a total of 30 lbs. If these cartons were strapped into a single package for one destination, the shipper would pay on the basis of only 27 lbs.

Internal bracing of furniture, such as novelty tables, is easily accomplished with steel strapping. To prevent movement and consequent damage, the product is firmly held to the base or top of the carton. The actual strapping of the container is done from the outside.

Fibre and corrugated wraps

Adequate protection to such diversified products as studio couches, steel shelving, safes, metal bars, desks and mill-work is made possible with fibre or corrugated wraps held in position by steel bands. The savings in packing, in material, in time which result from this practice are obvious. The receiver also benefits as snipping the straps quickly opens the package.

No general rule as to strap sizes can be formulated for specific products as individual packing practices vary. However, the vast possibilities for reducing shipping costs with steel-strapped wraps warrant investigation.

Bundling

The method of bundling is practical only on products that do not need protective covering.

Definite appeal to shippers for packages of this kind can be obtained by having the company name, slogan, sales message, or trade mark printed continuously on the strap. It thus becomes a new advertising medium.

Bales

Baling received its greatest impetus after World War I when shippers learned the savings which the Government had effected with this type of pack.

Obviously many products cannot be baled but, in general, any item that can be compressed is suitable for baling. Some of these are: bags, bedding, blankets, cloth, dry goods, feathers, fur, hair, hemp, hides, kapok, leather, mattresses, piece goods, pulp, towels, woolens, and yarns. Valuable storage space is saved, costs of transportation (especially on freighters), handling, and packing are reduced.

Burlap or waterproof paper is generally used as a covering material and the straps are applied while the bales are under compression. Tension is not required as expansion of the bale when released tightens the straps and takes up any appreciable slack.

The number of straps required depends upon the size, weight, and value of the baled contents. For small bales, four bands usually suffice—others may require from five to ten. The $^{5}/_{8}$-in. and $^{3}/_{4}$-in. widths of strapping are employed on almost all types of bales.

Skids

By moving production on steel-strapped skids it is possible to speed up the handling of materials, conserve valuable storage space, reduce the possibility of accidents to workmen, decrease claims for damage, increase good will in customers and substantially cut costs.

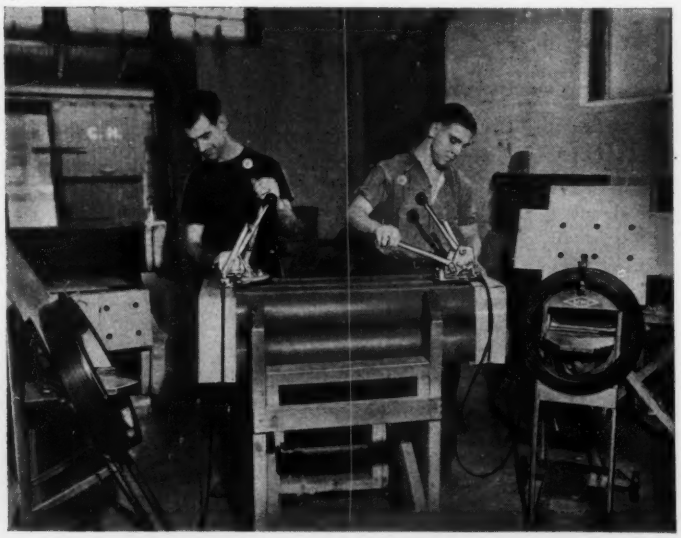
Paper manufacturers were the very first to recognize the possibilities of skid shipping and this method has been accepted as standard for years by paper shippers and receivers alike. Consider the added costs for packaging

3. Supercharger for fighting plane protected in transit by steel bands applied by new women workers. 4. Ammunition tubes, formerly packed in containers, are protected as well by steel-strapped fibre caps. Photos Acme Steel Co.

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and labor if paper could not be steel-strapped to easily movable skids—weighing up to 5,000 pounds each, and handled by one man! Steel producers are also large users of skids which not only permit easier unloading of cranes but also enable one man with a lift or power truck to move easily to the point of fabrication, loads weighing several tons.

The automotive industry has adopted skid shipping with excellent results for the manufacturers of both automobiles and parts. Products such as clutches, bumpers, mufflers, steering gears, oil filters, axles, wheels, wheel frames, springs etc., and transmission units are a few of the items that safely and economically move from the producers to the assembly lines.

Packaged articles in cartons and boxes are also placed on steel-strapped skids for ease in handling. Practically every industry can advantageously use this modern shipping method for inter-plant movement and delivery to the customer.

Some skids are designed for one trip and are non-returnable. The construction of the skids is important and the entire application requires study to meet conditions of stowing, storage, and customers' facilities. Lift truck and strapping manufacturers have accumulated a wealth of available information on this subject.

Carload ladings

The effectiveness of strapping extends also to carload ladings. Straight and mixed loads, pool and stop-over cars can also enjoy the benefits of strapping.

That the carriers recommend strapping for many commodities is evident from the publications of several divisions of the Association of American Railroads. Carriers use strapping in their own terminals for bracing LCL or merchandise cars and for re-coopering broken packages.

In box cars, steel bands are applied to half-car units of freight, which permits them to absorb rather than resist shocks during transportation. Bands are also used to anchor products in box cars as well as on gondola and flat cars. Strapping is employed to brace doors of the cars using a special strapping with high tensile strength for this purpose. Tools are available to brace all types of ladings.

Strapping setup important

Steel strapping can be used advantageously only when the proper equipment is installed and the correct size of band is applied. Some packages lend themselves to automatically seal-fed strappers, mounted as an integral part of the production line; others require hand tools. In some instances movable stands for the reels are advisable while in others stationary coil holders, mounted from the ceiling or placed on the shipping floor, will permit the most efficient application of strapping. Each case is different and merits competent counsel.

Strapping has become a vital part of the packing operations in every industry. It is rapidly being recognized that what happens to a product *after* it is made is equally as important as any situation confronted by the sales, engineering and production departments.

Table 1. Nailed Strapping: Sizes and Weights

.015 in. thick: light-and medium-weight packs

Width in Inches	*Small Coil* Ft.	Lbs.	*Large Coil* Ft.	Lbs.	*Estimated Pounds per 1,000 Ft.*
3/8	300	5.7	4,000	76	19.1
1/2	300	7.6	3,000	76	25.5
5/8	300	9.6	3,000	96	31.8
3/4	300	11.5	2,000	76	38.2
7/8	300	13.4	2,000	89	44.6
1	300	15.3	1,500	76	50.9

.028 in. thick: heavy and bulky packs

Width in Inches	*Small Coil* Ft.	Lbs.	*Large Coil* Ft.	Lbs.	*Estimated Pounds per 1,000 Ft.*
1/2	300	14.2	3,000	143	47.5
5/8	300	17.8	2,000	119	59.4
3/4	300	21.4	2,000	143	71.3
7/8	300	25.0	1,500	125	83.2
1	300	28.5	1,500	143	95.1

Table 2. Standard Sizes of Nailless Strapping

(weights and footages are approximate)

Width, Thickness in Inches	*Ft. per Lb.*	*Lbs. per 1,000 Ft.*
1/4 × .015	78.55	12.73
1/4 × .020	58.89	16.98
3/8 × .010	78.55	12.73
3/8 × .012	65.45	15.28
3/8 × .015	52.45	19.10
1/2 × .010	58.89	16.98
1/2 × .012	49.06	20.38
1/2 × .015	39.22	25.47
1/2 × .018	32.75	30.56
1/2 × .020	29.44	33.96
5/8 × .010	47.13	21.22
5/8 × .012	39.22	25.47
5/8 × .015	31.41	31.84
5/8 × .018	26.18	38.20
5/8 × .020	23.32	42.45
5/8 × .023	20.48	48.82
3/4 × .015	26.18	38.20
3/4 × .018	21.81	45.85
3/4 × .020	19.63	50.94
3/4 × .023	17.05	58.58
3/4 × .028	14.03	71.28
*3/4 × .035	11.23	89.14
*3/4 × .050	7.85	127.34
*1 1/4 × .035	6.73	148.58
*1 1/4 × .050	4.77	212.24
*2 × .050	2.95	339.60

* Sizes generally used for bracing carload freight.

Table 3. Permissible Reductions in Lumber Thickness

thickness of sides, top and bottom of wooden shipping containers, in inches

Unstrapped	*Strapped* *One Strap*	*Two or More Straps*
7/8	5/8	1/2
13/16	5/8	1/2
5/8	1/2	3/8
9/16	7/16	5/16
1/2	3/8	5/16
7/16	5/16	1/4
3/8	5/16	1/4

(Data from Bulletin No. 14: Domestic Commerce Series; United States Department of Commerce.)

Table 4. Sizes of Steel Strapping for Wooden Boxes of Various Gross Weights

Gross Weight of Box in Pounds	*Dimensions of Strapping in Inches, when Different Number of Straps Are Used* *One Strap*	*Two Straps*	*Three Straps*
50	1/2 × .020	3/8 × .015	.....
100	5/8 × .020	1/2 × .018	.....
200	3/4 × .023	5/8 × .020	1/2 × .018
300	.....	5/8 × .023	1/2 × .020
400	.....	3/4 × .020	1/2 × .023
500	.....	3/4 × .023	5/8 × .023

Types of gummed tape

by Juan Oliver

Only 20 years ago, when a prominent gummed paper manufacturer was asked to list the uses of gummed products, he was able to name only eight. Today, there are at least a thousand, for there is scarcely an industry which does not employ gummed paper products either in the form of labels, stickers, wrappers or sealing tapes. The gumming industry today makes products ranging from the gummed papers used for purely decorative purposes to heavy-duty waterproof gummed tapes.*

Gummed products fall into two categories: sealing tapes, sold in rolls, and flat gummed sheets for wrapping or converting.

Sealing tapes play a decisive roll in the efficient preparation of containers for transportation. They can literally "make or break" a container. The following is a list of the more commonly used gummed tapes:

Standard Gummed Tape—35-lb., 60-lb. and 90-lb. gumming kraft, gummed on one side with animal or vegetable glue or dextrine adhesives. They are made in brown, as well as in a variety of other colors—red, green, orange, etc., and they may be printed to show the customer's trademark or brand name. They are usually sold in narrow rolls to fit standard sealing tape machines, and are used for sealing parcels, bundles or cartons, the heavier weight being selected for heavier duty sealing.

Extra-heavy Gummed Kraft, 100 to 160 lb., are used as protective coverings for the edges of such heavy articles as bathtubs, basins and automobile fenders to prevent chipping and scratching during transportation.

Stay Paper—90-lb., 100-lb. and 120-lb. kraft, coated on one side with a special high-test glue which has very fast-sticking qualities. It comes in brown and in a variety of colors, and is usually made with a slight crease down the center. It is applied to cover the stitches and reinforce the corners on lightweight boxes.

Reinforced Crepe Kraft—The priority on sisal has brought about an efficient substitution in the form of a creped kraft tape reinforced with thread, laminated with asphalt and combined with 60-lb gummed kraft. It is used on the "manufacturers joint" of fibre containers.

Gummed Veneer Tape—35-lb., 40-lb., 50-lb. and 60-lb. kraft, gummed with specially blended high-grade glue for high-speed taping of wood veneers. The glue must be free of acids or other ingredients which might destroy the finish of the wood. Veneer tape is used to hold two strips of veneer together until they are firmly adhered to the underlying structure. The tape is then sanded off. There is also some demand for a 35-lb. unsized kraft which is moistened and then removed without sanding.

Corrugated Cambrics come in two types: duplex paper combined with cloth and gummed on the paper side, and clay-filled, a gummed cloth which had previously been impregnated with clay. Both are used by the fibre container industry to make the "manufacturers joint" which is an indispensable part of each box. They are made in various weights for use in different test boxes.

Gummed Holland—Clay-filled gummed cloth used primarily for binding and edging by bookbinders, lampshade, writing pad and envelope manufacturers.

Gummed Albert and Kelco—These are the same type as gummed Hollands, but are stronger inasmuch as the cloth has $2^1/_2$ times as many thread as the Hollands.

Gummed Tablet Tape—Embossed paper tape used by tablet manufacturers as binding on pads, etc.

Gummed Glassine Tape—Transparent gummed paper used for mending dollar bills and torn paper of all kinds.

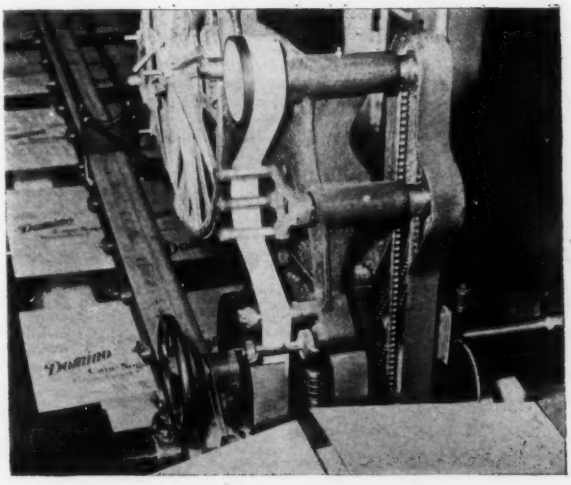
Waterproof Sealing Tape—Solseal is an asphalt-laminated paper, coated one side with waterproof glue. It has recently been developed by the industry in response to the wartime necessity for substituting waterproof fibre containers for wood and metal. The waterproof tape forms an efficient seal for such containers, and insures the maintenance of moistureproof conditions for overseas shipments as well as for the cold storage of perishables.

Waterproof Paper—This is made of two layers of kraft, 30 lb. or 60 lb., laminated with asphalt. It is used as wrapping and lining material for the maintenance of moistureproof conditions on railroads, steamships and in warehouses to prevent spoilage of perishables. The electrical and automobile industries also use it for wrapping on fenders, motors, etc., to prevent rusting.

Cloth-lined Paper—Cloth, combined with paper, used for the manufacture of tags and labels.

Gummed Label Papers—For labels, seals, reinforcements and decorative purposes. These come in a variety of paper, coated and uncoated, white and colored.

Machine-applied gummed tape is essential for corrugated shipping cases. Photo Gaylord Container Corp.



* See also "Tape for Waterproof Containers," p. 634.

Tape for waterproof containers

by R. S. Rowlett

Just as a chain is no stronger than its weakest link, a container is no more protective than the gummed tape which binds it together. In this connection, a special problem has arisen in the overseas shipment of some ordnance material in fibreboard or corrugated cartons.

Often two or more such containers are originally shipped together, overpacked in wood or some other stronger and more resistant container. But upon arrival at a base, the outer container must often be removed and the fibreboard units sent separately—and unprotected—to different forward echelons. In such a case, the fibreboard carton itself becomes the outer container, and it must withstand any conditions, however severe, to which it may be subjected. The so-called V-3 solid-fibreboard or corrugated carton is the most widely used for this purpose.

It was soon found, however, as with the V-1 containers, that the use of ordinary gummed tape to seal these cartons nullified the protection they provided. A glue tape moistened and applied with water can obviously be released by any water or high humidity with which it subsequently comes into contact. Therefore, when such ordinary tape was used, the value of the V-3 carton as an outer container was practically nil, its value even as an intermediate barrier doubtful. The alternative was the use of extremely critical and seriously short waterproof pressure tapes.

An urgent need had developed, therefore, for a non-critical waterproof tape with an adhesive at least as water-resistant as the V-3 board. Largely by coincidence as far as timing is concerned the gumming industry was ready.

For many years this industry had seen the need for a waterproof tape and had worked to develop one. It was felt at one time that an ordinary glue tape treated with formaldehyde or some similar solvent would serve the purpose—but this proved a false hope. A committee, formed to correlate the research of individual members of the industry, encountered the familar obstacles and shortages which made all such work so difficult in the early years of the war. A combination of glue and emulsified asphalt, to be sealed by heat, was developed by one member independently, on the basis of long-standing patents. This tape gave excellent results for both outer and inner strapping and sealing, and would probably have been accepted had steel been made available for the new type of sealing equipment required. Other members of the committee developed products from synthetic resins—but before approval was obtained, shortages of material were encountered which made it plain that for the duration they could never be produced in satisfactory quantities. Although one member of the industry is now offering such a tape and has had it approved, development along these lines is largely at a halt. Spurred by the needs of the armed services, the work of the committee and of the individual companies never ceased.

At the crucial moment a satisfactory tape was offered and approved. This tape, called Solseal, is an outgrowth of the asphalt-glue adhesive which has previously been mentioned, but now a way had been found to apply it with a liquid solvent on standard equipment. In addition to the originator of this tape, nine companies, comprising the great bulk of the productive capacity of the industry, have now been licensed to produce it. One other company has had a similar tape approved, and one of the licensees is offering, at the same time, an approved product of its own.

A large step forward has been taken by the development and approval of waterproof tapes which can be supplied in the required quantities. The anomaly of a specially treated water-resistant board sealed and held together by a completely non-water-resistant gummed tape has been eliminated. Large quantities of one of the most critical packaging materials in use today, the rubber-consuming pressure tape, have been saved for other uses where its peculiar qualities are used to best advantages—for example, in the sealing of shell canisters which must be opened quickly and perhaps resealed on the spot. This new product has the further advantage of requiring no special machinery and no volatile solvents in its application. It is applied in the same manner as ordinary gummed tape.

Indicative of the importance of this development is the fact that, while very little is being supplied on a lower priority than AA-1, the demand for it from quarters that can extend such a priority is already—after only a few months—taxing the ability of the originator to produce, and has brought the industry face to face with an impending shortage of backing material.

Gummed tape, applied by hand, is used in well-run shipping departments for sealing. Photo Mitchell & Weber.



Equipment for applying tape

by M. W. Waggoner

Until comparatively recently, three obstacles stood in the way of using gummed tape to seal shipping cases: freight, express and postal regulations must approve; gummed tape must be uniform in quality; mechanical devices must be able to operate quickly and efficiently to form an inseparable bond between tape and container.

Progress has been made in all three directions. Rule 41 of the Official Express Classification accepts 60-lb. kraft tape provided the strip is 2 in. or more in width and that the ends overlap $2^1/_2$ in. Rule 18 likewise approves 60-lb. tape provided the strip is 2 in. or more in width and ends overlap in various lengths, depending on whether the inner flaps are more or less than 6 in. apart. Parcel post regulations also approve gummed tape, provided the parcel bears a *printed* label showing nature of contents and name of manufacturer, producer or shipper, also the endorsement permitting opening the parcel for inspection.

Tape manufacturers have developed better types of tape, and recent severe tests have demonstrated in actual practice that cases sealed with gummed tape can withstand tough handling. Manufacturers of equipment for applying gummed tape have also been making steady advances. This article proposes to deal with the equipment and its efficient use.

Various moistening methods

A method developed in Austria a number of years ago moistened the tape with a wick. However, in a relatively short time a crust was formed on the wick of the drying gum. Improvements over the Austrian models offered by American manufacturers are essentially the same, with a felt wick moistener, but they too failed to perform the moistening job in a satisfactory manner.

Roller-type moisteners, next introduced, were more satisfactory, but a still greater improvement came in 1922 with the "hand-pull" sealer. This uses a principle similar to the stroke of a painter's brush. Brushes are also used in many of the most up-to-date machines, although the substitute bristles available at present require a mechanical adjustment to perform satisfactorily.

Semi-automatic machine

With semi-automatic machines, tape is not pulled manually, but instead it is pushed across the moistener by hand action, either on the level or, more commonly, on a sliding feed bar. In other words, regardless of a packer's inexperience or the "rush" conditions under which he is sealing cartons, correct and constant pressure is automatically maintained on the tape when it passes over the moistening unit by means of a gravity pressure plate. Hand action applied to a shear near the moistening unit usually cuts the tape on this kind of machine. Some semi-automatic models will slit gummed tape into 2, 3 or 4 widths during the feed stroke, and a number are equipped with an auxiliary water fountain which reduces "time-outs" for tank refilling.

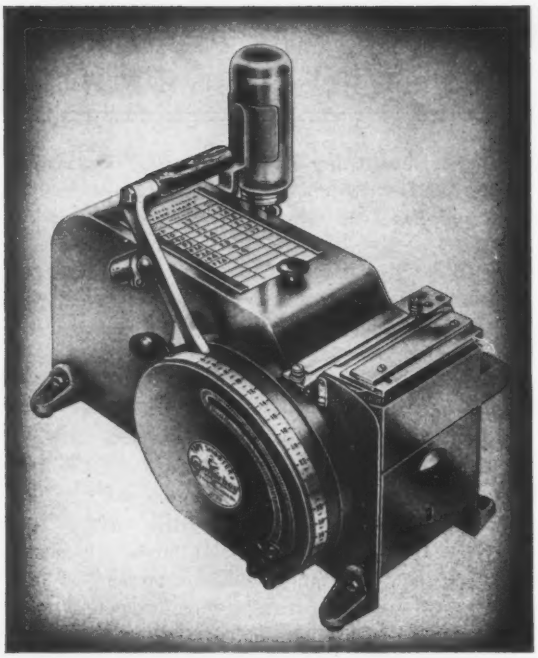
Automatic water-supply control

All automatic machines and a few semi-automatic sealers are equipped with automatic water supply-control. This feature makes it possible for a gummed-tape user to preset the machine for the *exact* amount of moisture required accurately to condition his tape for maximum adhesion. A simple set-screw adjustment beneath the auxiliary

1



1. Use of gummed tape for case sealing grows with improvements in tape and machines for applying it simply and neatly, as with the fully automatic equipment illustrated here. Photo Better Packages, Inc.





2. Fully automatic tape-sealing machine. By simply pulling a handle, tape is thoroughly conditioned for maximum adhesion. 3. Semi-automatic machine for correct and constant pressure. Photos Better Packages, Inc.

fountain permits more or less water to flow from it into the moistening tank where the proper level is constantly maintained.

No sealing machine can possibly condition gummed tape to its anticipated adhesion during *every* season of the year without automatic water-supply control. Tape requires less moisture in hot, humid weather than it does during cold, wintry months. Consequently, *adjustable water-supply control* is of immeasurable assistance in obtaining maximum gummed-tape adhesion during *every* season of the year.

Automatic moistening machines

A new problem in the adhesion of gummed tape was introduced when users began demanding "setting time" of four to five seconds. At the same time, soft porous jute containers were being replaced by harder and far less porous kraft which contained a certain amount of sizing in the pulp for waterproofing effects. This advancement not only added to the ability of containers to withstand long trips, but allowed heavier and more valuable goods to be safely shipped in containers, if the seals were secure.

Automatic machines were developed to cope with this problem. These machines completely revolutionized the tape-sealing field when they were introduced, not only because they expelled tape faster than ever before, but because they distributed an increased amount of water at greater speed and evenly.

Some automatic gummed-tape sealing machines practically eliminate the packer entirely from moistening picture, being only 10 per cent dependent upon his ability. By simply pulling a handle, tape is thoroughly conditioned for maximum adhesion. The strip is automatically cut upon the handle's release.

Importance of the seal

A shipping container is no stronger than its seal. The particularly vulnerable points of any container are the center breaks and horizontal end scores. Unless they are properly and securely sealed, the contents might as well be shipped in a paper bag. When a shipper considers the shocks and jolts a container might be forced to endure while in transit, the inclination is to be more careful in sealing it. Unfortunately, too little time in the past has been spent investigating this important phase of the manufacturing process. Today, more than ever, because of the pressure being placed upon shipping departments, hasty, haphazard sealing occurs too frequently. This is dangerous to the shipment itself and dangerous to the shipper's future relations with his customers.

Forming the bond

The *permanent* grip of gummed sealing tape is obtained by the "bond" formed between the soluble glue of the tape and the thousands of tiny "pores" of the carton through which the glue penetrates. In other words, when moisture is applied to gummed sealing tape, the glue dissolves into a flowable solution. When this solution of glue and water is applied to the carton skin, it penetrates into the dry porous surface. After the water has evaporated, these thousands of container surface pores are filled with pure glue from the surface of the tape. Tape, properly conditioned for maximum penetration, consequently helps form an inseparable bond between tape and container. Any attempt to remove tape which has been thoroughly conditioned and correctly applied, could only be accomplished by also tearing the carton skin down to the line of glue penetration.

Special instruction charts on how to seal are furnished by machine and tape manufacturers. Proper rubbing makes certain that the tape rigidly grips the fibreboard surface until it "sets." Follow these simple rules:

1. Rub with the palm of the hand, not with fingers.
2. Press and rub as though ironing.

3. Let hand "follow" box over ends in one sweeping stroke.
4. Rub the full width of the strip. After a strip of tape has been centered over the section to be sealed, apply it and immediately *rub* from the center out. This eliminates any tendency for the tape to back-buckle. Apply extra pressure when rubbing the tape over the "corner" of end scores. Make certain the joint remains secure and tightly sealed during the few seconds "setting time."

Shippers who pack exceptionally heavy merchandise in tape-sealed containers often seem to think that additional strips of gummed tape applied in various directions on the carton will reinforce it for maximum security of the contents. However, a tape-sealed carton can best be reinforced by applying the second strip *directly on top of the first*. In this way the bursting strength of the protective strip will actually be increased from 60 lbs. to 120 lbs.

Twenty-five per cent additional protection is obtained when the overlaps of end strips are applied horizontally on the container and not vertically. Always use a good, sturdy carton. Be sure to pack the contents in it as neatly and snugly as possible. Apply properly moistened strip of tape along the seam. Do not allow ends to overlap more than three inches. Apply strips on all end seams. Again, do not allow ends to overlap more than three inches around the corners. Bend ends back around the corners and along the top edges in order to give maximum reinforcement.

Using tape economically

Simple pressure plate adjustments of completely automatic moistening machines can be preset for the *exact* requirements of the gummed tape being used. For example, the tape you are using probably requires more or less applied pressure as it passes over the moistening unit than that used by another shipper. If your packer is using a hand moistener you should make certain that the machine is placed in the proper position, i.e., at eye level, and that he is cautioned about the pitfalls in the use of this equipment.

If your shipper is using a semi-automatic sealer, he can adjust the water supply so that the proper level is maintained in the tank, but mechanical pressure remains constant and hence fails to give the best results if lengths exceed 15 in.

Completely automatic moistening machines, though higher priced, yield maximum efficiency because, not only can the water level be adjusted to the specific requirements of your tape, but the amount of mechanical pressure needed as the tape passes over the moistening unit can be controlled by simple adjustments on the plate itself. This is very important when lengths used exceed 15 in. and are rapidly dispensed.

Automatic moistening machines also provide the convenience of permitting tape to become "tacky" before it is applied. For a faster grip, it is always advisable that a packer dispense a second strip from the machine and permit it to dangle a few seconds while applying the first.

Setting machines for required lengths

Preset, selective-measuring machines are offered by a few manufacturers to increase the sealing output for shippers who tape-seal "runs" of containers each having the same length and the same width. These machines can be set in advance for repeated feed of the long and short strips. However, once set for predetermined strips, intermediate lengths are possible only by resetting.

Many semi-automatic and fully automatic machines are equipped with measuring scales by which the packer can accurately determine the correct length of tape to dispense for the carton being sealed. Shippers should instruct their box maker (who as a rule will be glad to coöperate) to imprint their shipping containers with the required lengths for the short and long sealing strips.

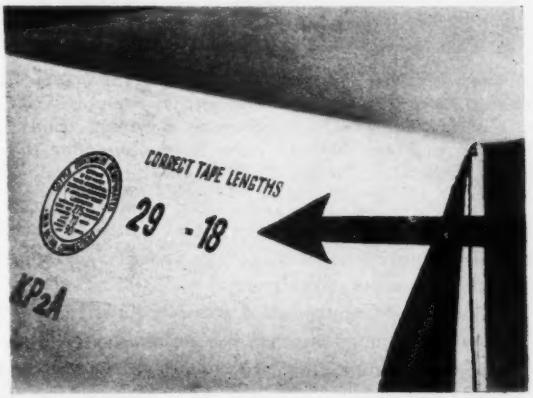
Most containers require 6 strips of tape for proper sealing. This means 12 tape *ends*. Hit-or-miss methods usually waste about 3 in. of tape on each tape end—a full yard of needless tape on each box that *will not give additional security to the contents*.

Tape-conditioning tests

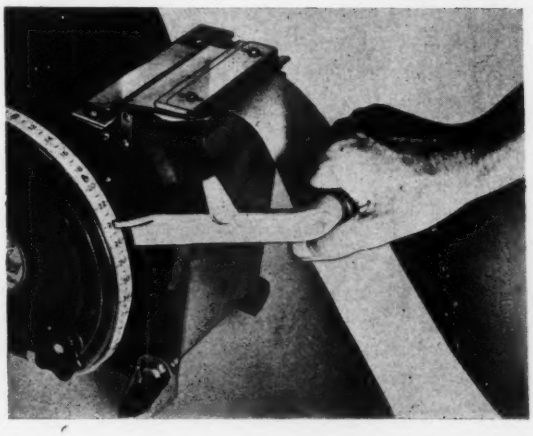
Each gummed-tape manufacturer uses a glue formula which is separate and distinct from that used by any of his competitors. Although intended to accomplish one

4. For the sake of economy and convenience to the shipper, the correct tape lengths may be printed on the box by the box maker. 5. Tape dispensers insure shippers against waste. Photos Better Packages, Inc.

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6 and 7. Fully automatic tape-moistening machine with a visual, positive-automatic moistening control. A pull of the lever automatically measures, moistens, cuts off and delivers the tape to the operator in required lengths. Photos Nashua Package Sealing Co.

specific result—safe and satisfactory sealing—various formulas require various degrees of applied pressure and different quantities of moisture.

Safe sealing—Gummed tape properly moistened so as to assure maximum merchandise protection presents a smooth, even appearance as though it were freshly painted. It is thoroughly wet, but "tacky." It does not slide when applied to the carton.

Poor sealing—Gummed tape insufficiently moistened for maximum merchandise protection is smooth but shows brush lines. The water is only surface deep.

Dangerous sealing—Gummed tape moistened far below requirements for normal merchandise protection shows an uneven coating of "loose" water and dry ends. It is slippery only where the moisture has held.

Touch tests

Thumb test—Elementary touch tests which can be made quickly by the gummed-tape user will further indicate the extent of war goods protection being obtained with the particular moistening method employed. The thumb test is the simplest of the "touch" family and enables a shipper instantly to ascertain the adhesive potential of his moistened strip.

Both ends—After dispensing an approximate 18-in. strip of gummed tape in the usual manner, hold it gum up. Press thumbs into the moistened surface and begin rotating the fleshy part in the fixed positions. This will determine the looseness of the glue and protective quality of the soluble mixtures. Make the test simultaneously at both ends of the strip. After having rotated the thumbs in this fixed position on both ends of the tape, lift them slowly.

Loose glue—The extent of thorough conditioning of the strip being tested is in direct proportion to the tenaciousness with which the mixture adheres to the thumb while in the process of lifting it from the tape. For maximum war goods protection the solution should form at least one quarter inch "strands." Anything less indicates dangerous sealing.

Incidentally, a moistened surface which retains a clear impression of a thumb print is far too dry to insure maximum protection. Any moistened surface which enables the rotating thumb to slip and slide vigorously is far too wet to insure maximum protection.

Pattern and deposit test

After having moistened an approximately 18-in. strip of tape in the customary manner, fold over one end an inch down so as to obtain a finger hold on the tape. Apply on a hard-finished piece of clean fibreboard. Firmly rub the entire kraft surface of the strip with *one sweep*. Slowly peel off the tape and note the "pattern" remaining on the board.

Safe sealing—A uniform, heavy "deposit" of gum and water mixture transferred to fibreboard surface implies a perfect moistening result which will yield maximum war goods protection.

Poor sealing—Lighter, splashy "deposit" of gum and water mixture transferred to fibreboard surface will not bring about a maximum of tape-sealed merchandise protection as mentioned above. The strip firmly adheres in some spots, feebly in others. Fifty per cent of merchandise protection is lost.

Dangerous sealing—Uneven, spotty "deposit" transferred to fibreboard surface indicates the existence of an extremely unsatisfactory moisture condition. Sections of the strip are bone dry—other sections are doused with water. Tape moistened in this manner will peel from carton skin within a few hours after being applied. War goods tape-sealed protection is at an absolute minimum.

Check-deposit test—Let the pattern dry. Then holding the fibreboard securely with one hand, slightly dampen the finger tips of the other and greatly impress and slide them over several parts of the pattern surface. If you wish to make comparisons of strips moistened by various sealing-tape machines, before proceeding always first wash off the residue formed on your finger tips.

There is one particularly startling discovery you will make during "check-deposit" tests. Areas both too dry and too wet distinctly lack a strong, tacky glue deposit which yields maximum war-goods protection.

Protective pads & cushions

Just as there is a wide variety of types of shipping containers and packages to choose from, so there is a wide range of types of protective pads and cushions available to the packing engineer. The same general rules apply in the selection and design of interior packing protection as apply in the selection and design of the shipping container.

Simply stated, the material that will best perform the function of product protection at the lowest cost is the obvious material to employ. It is equally obvious that the matter of performance comes first in importance—cost second. All types of interior packing pads and cushions, sheets and wraps, from the corrugated board air pad to the excelsior pad, from loose excelsior, wood wool and shredded tissue to the softer paddings such as cotton, felt and, more recently, creped wadding—all of these factors have their logical places in the packaging picture.

Creped wadding has made steady progress in its general adoption as a staple product in the packing field. It has many natural advantages. It is soft, clean, flexible, cushiony, easily cut and handled, available in many convenient forms, sheets, pads, rolls, in various thicknesses and with various backing materials. Because of its ready adaptability to the commonplace as well as to the unusual packing problem, it contributes to speeding up the operation of packing and cuts costs on many jobs where formerly baser types of packing materials have been used. In effect, all packaging is the means of protecting products from some form of damage while in transit or storage on the way to or awaiting the time of use. The ultimate user has need of and has become accustomed to delivery of the products he buys in factory condition.

As products, new and old, are freshly packaged, new problems of protection arise. Almost all products need some interior protection other than a cleverly designed carton. Most carton designers recognize that and today they keep well supplied with and informed as to accessory materials, such as interior paddings, wraps and cushions of a protective nature.

Generally the need of interior packing protection is due to the fragility of the product's finish. Finishes of all types—varnish, lacquer, enamel, porcelain—are used primarily to protect the product itself from wear, moisture, stain, chemical and physical changes. Some finishes provide beauty of the product while protecting it; others merely preserve this beauty and add nothing to its eye-appeal. Paradoxically, these protective finishes themselves need protection. That is the function of protective pads and cushions. The thickness and size of protective pads or cushions are determined by a number of considerations: the nature of the product, the weight, protection of finish or structure, the type of packing container, the nature of the journey, and the method of handling or warehousing.

In some cases the packing material is employed as a contact pad in conjunction with rigid interior packing for facing of corrugated pads or wood bracing members of wooden containers. In other cases it is applied in sheet form to cover wide areas of finished surface as a cushion protection from direct contact with the walls of corrugated or fibre containers. In others, particularly in the packing of small fragile articles, or in parcel post packing of liquids, it is used in thick blankets to swathe the product completely in a resilient cushion which will provide full protection.

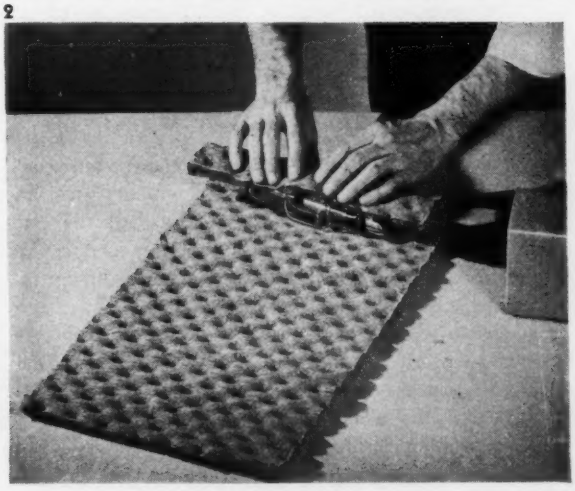
Used as a buffer between product finish and side or

1. Padding made of material with kraft backing, punch embossed, is used to protect aircraft parts in shipping containers. 2. Shipping cushions for cathode tubes are dimple embossed, resist moisture. Photos Kimberly-Clark Corp.

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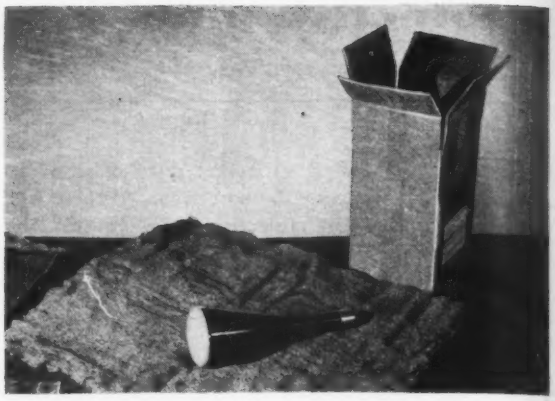


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3. Flasks of saline solution go overseas wrapped in 10-ply creped padding. It resists moisture, slows absorption from leaks. 4. Three thick, moisture-resistant pads cushion x-ray tubes for shipment. Photos Kimberly-Clark Corp.

member of packing container, creped wadding provides the four essentials of a packing protection material:

1. Cushion to equalize the irregularities of the two opposing surfaces and eliminate press marking.
2. Reduction of surface "burning" through absorption within padding of vibration in transit.
3. Surface smoothness that increases with pressure to reduce further hazard of "burning."
4. Conformability to surface, which prevents cinders or other gritty substances from becoming imbedded between finish and container walls.

Not so many years ago internal packing materials were given but little attention. They were considered necessary evils, avoided where possible.

The functions of interior protective packing design and materials used for the prevention of transit damage may be stated generally as:

1. Absorbing shocks transmitted to the product either from external blows received by the container or by concussion with each other when several products are packed in the container.
2. Absorbing continuous vibration which all containers are subject to in transit and which would be transmitted directly, with damaging effect, to the finish of the packed product.
3. Absorbing liquids from broken bottles or from leaking closures.

Eye appeal in packaging naturally plays a most important role as a sales-display factor with certain consumer products of the luxury class of which cosmetics, confectionery, candles are examples—products that vie with each other for consumer attention in dressed up packages. Like all other important manufacturing operations, packaging of mass production items long ago progressed to the stage of engineering design and is now in the domain of the skilled technician. Because such packaging is a practical art, the factor of utility at all times governs the selection of materials employed.

In all packing design the engineer is governed by a great many considerations, including size, shape and weight of product, the construction and finish of the product, how many units must be packed in the container, cost allowance, handling, storage and transportation conditions, etc. Equally important with the type of container is the method of interior packing to be employed. Here again he has a fairly wide choice, but the general divisions are simplified into the three methods discussed below.

Compression packing

Compression packing is used where the product is completely protected on one or more (in some cases all) surfaces with thick cushions of protective packing material that hold the product in place, prevent contact with other products within the container, prevent its contact with the inside walls of the container, absorb shock and vibration in transit, handling, storage, prevent breakage and surface damage.

Suspension packing

A product is suspension packed when it is suspended by bolting or is otherwise anchored to one interior wall of the container so that it is free from contact with all other walls. In some cases, protection padding of appropriate thickness is located at emergency points of contact with braces or internal framing members of wood containers or other type containers.

Combination compression-suspension packing

Where the product is protected on one or more or all surfaces by a thin sheet or wrap or protective padding, or where contact pads are placed on the braces or framing members to prevent direct contact of finish with the inner walls of the container so that rubbing and press-marking of finish is eliminated. For many such containers the design favors lightness with strength, but the product packed is depended on to supply more or less of the rigidity of the package. The function of the protective packing material in such cases is to distribute so far as possible the weight of the contacting wall or brace or member over the greatest area.

Flexible corrugated for protection

by Paul Thompson

A new packing material, which has become widely used for both inner and outer packing, has taken its place among major packing mediums. It is a paradoxical material—a corrugated paper which can be folded like uncorrugated paper. Related in type to single-face corrugated, it combines a smooth backing sheet with a corrugated facing. The paper used for the corrugations is generally 0.009 in. in thickness, while the backing sheets are of many types and weights.

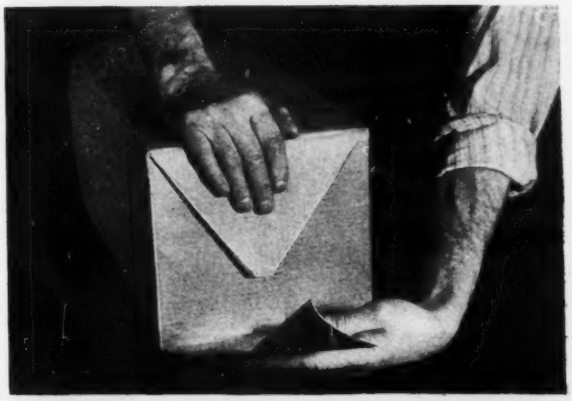
The revolutionary feature distinguishing it from single-face corrugated is the construction of the corrugations. These are scored or indented across the top so that they are divided into many segments, thus permitting them to be folded in any direction. While possessing the protective qualities of corrugated, flexible corrugated can be wrapped around any shape or object—whether round, cubical or cylindrical—with the same freedom as wrapping paper.

A wide range of uses

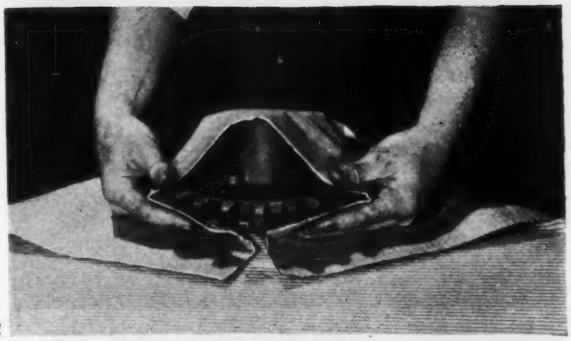
A comparatively new product, flexible corrugated is rapidly being utilized for an increasing number of purposes. One of its earliest uses was in the place of cartons or single-face corrugated and wrapping paper for parcel post and express. By combining the protective qualities of cushioning and an outer wrapping, it can be used in place of double wrappings of single-face corrugated and paper, saving both time and material. Since flexible corrugated can be folded in any direction, it proves particularly valuable in packaging the endless flow of sizes and shapes which passes over most packing benches. For wide packages, flexible corrugated can be used as it comes from the roll. For narrow packages, the roll width becomes the long dimension of the wrap. For even greater variety, it can be mounted in multiple widths on suitable compact dispensers.

Today, flexible corrugated has become an important material for production packing in manufacturing departments. Products as large as bomber wing-flaps, truck fenders and jumbo rolls of fabric are now being safely shipped, completely packed in this material.

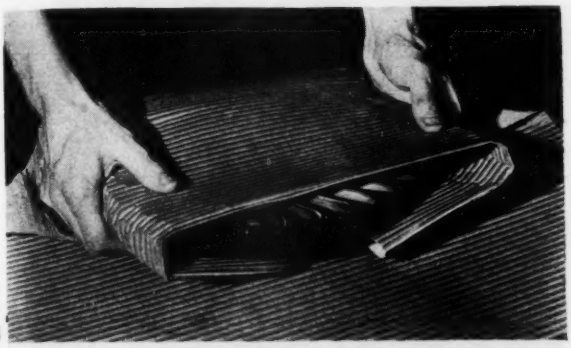
As a replacement for inner packing materials such as excelsior, shredded news and sawdust, flexible corrugated has the advantages of cleanliness and simplicity. The product cannot shift inside the wrapping, less bulk is required for safe protection. The wartime importance



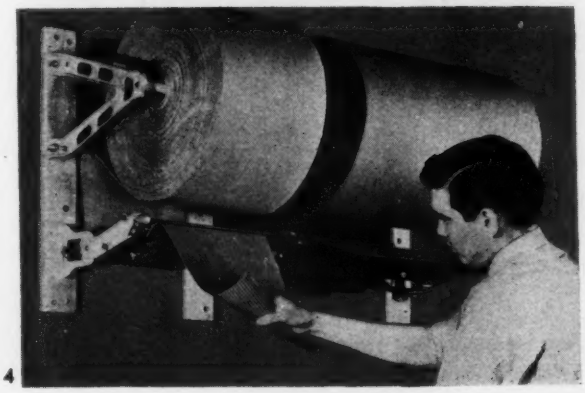
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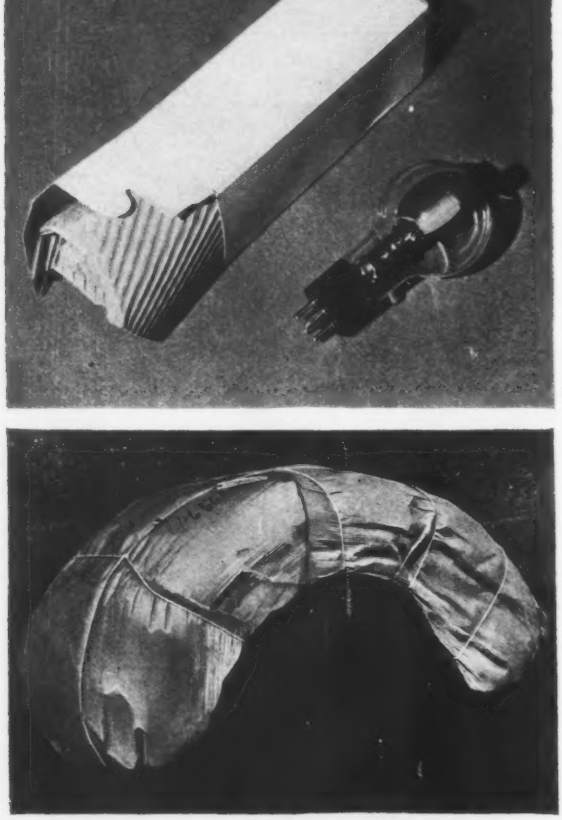


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1. Versatile flexible corrugated can be folded, thus, by hand or machine packing. 2. The material can be wrapped around odd-shaped products for close fit and cushion. 3. For a heavy gear ring, a greaseproof, non-corrosive flexible corrugated is used, multiple thicknesses protect machined teeth. 4. Multiple-unit overhead cutter used for dispensing. Photos Sherman Paper Products Corp.



5



6



7

5. As an inner pack for such fragile and delicate objects as radio tubes, flexible corrugated furnishes a loose, springy wrap which provides a floating cushion. 6. Heavy objects, like this truck fender, can be wrapped in flexible corrugated. This method, replacing bulky crates, is approved for freight shipments. 7. As part of production operations, large rolls of cotton fabrics are wrapped in flexible corrugated and ready for storage or shipment. Photos Sherman Paper Products Corp.

of reducing cube and weight in this way will operate as well in the economy of peacetime shippers.

Among the inherent advantages of flexible corrugated is the ability to multiply cushioning protection in wrapping operations. The package can be planned so that the multiple thicknesses developed in wrapping will give extra protection to vulnerable areas, with still further thicknesses or folds easily added for extreme protection.

For light fragile products such as glass coffee makers and radio tubes, a loose wrap of flexible corrugated has been found to provide an excellent floating inner cushion. Used in this way, the material takes the place of die-cut partitions, suspending the product inside the unit package or shipping container.

Flexible corrugated can be used on automatic wrapping machines. Handled in roll form, it can be wrapped with the customary machine operations to provide outer shipping containers.

To meet the needs of wartime packing for metal parts, new types of flexible corrugated have been developed which have corrugations of greaseproof, non-corosive and acid-free paper, with a backing of creped kraft or 30–30–30 waterproof paper. This is used only for inner packing on overseas shipment, but may be used for outer packing on domestic shipments.

Types of flexible corrugated

The most widely used type has kraft backing which varies in weight to meet different requirements. It ranges from the light 35-lb. weight to the extra-heavy board types 0.016 inch in thickness, and the multiple, reinforced types. Other varieties include the greaseproof, non-corrosive types; one with creped backing used primarily for inner packing; and the waterproof 30-30–30.

Most shippers find the roll dispensers best for general use. These can be had to meet different requirements for use under, over, or on the bench, and come in single-or multiple-roll widths. Where production requirements call for the packing of large quantities or uniform sizes, flexible corrugated is specified in sheets or die-cut shapes.

Flexible corrugated may be sealed with gummed or pressure sealing tape, tied with twine, stapled, made into envelopes or bags for production packing.

Expanding postwar uses

There are few fields where flexible corrugated is not now used in some way. During the war, the greatest attention has been focused upon its use to save time, materials, weight and space. After the war, the emphasis will logically shift to its use in reducing cost. The increasing use of high-cost air express has thrown the spotlight on the savings in weight. Since, unlike cartons or boxes, it is not limited to predetermined sizes, it is more versatile for general shipping use, effecting over-all reductions in size and weight of shipment. As manufacturers use flexible corrugated, they find an increasing range of uses for it as a complete packing material or as an auxiliary material to be used in conjunction with inner packages or shipping containers.

Shipment of freight by air

by J. D. Malcolmson

Air freight growth furnishes another emphatic reminder of the tremendous acceleration that war can contribute to a new, and ordinarily slow, development. Prior to December, 1941, the amount of freight carried by air was negligible—indeed most people thought passengers and air mail were the only sources of air line revenue. Thus only 22 tons of express and freight were carried by air in 1927, and this figure gradually moved up to 11,000 tons for the year 1941. But now see what the war did: by the autumn of 1943, the Army Air Transport Command alone was flying cargo at the rate of over 35,000 tons per annum, and this figure was about equaled by the combined tonnage handled by the 20 domestic air lines in the same year. In addition to that, the Naval Air Transport Service was carrying an undisclosed amount of freight which undoubtedly approached these figures. To this total must be added the rest of the Western Hemisphere, and this is no small addition inasmuch as South America has always shipped more freight by air than has the United States.

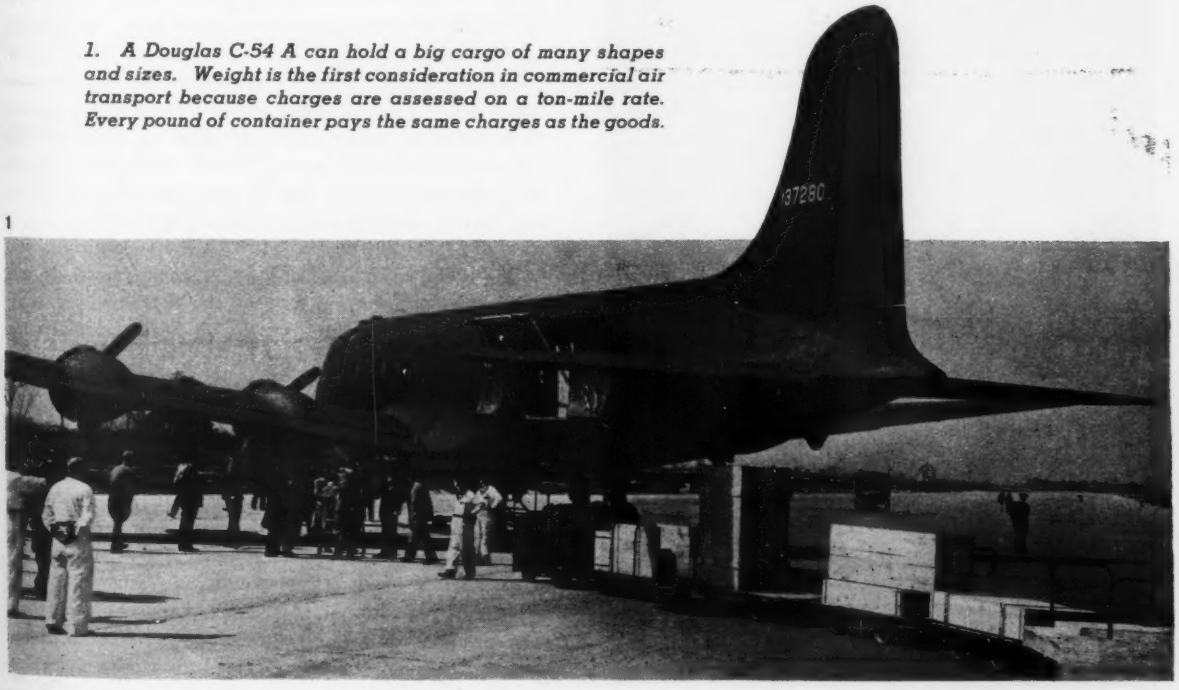
This wartime acceleration in air freight bids fair to continue into the postwar period. For example in 1941, the peak year of automobile production, we produced $3,700,000,000 worth of automobiles, but in 1943 the OWI states that we planned to spend 5.4 times that amount for aircraft—the colossal total of $20,000,000,000 or almost $1/7$ of our total estimated national income. In addition, in 1944 it is planned to increase the weight of aircraft produced by 55 per cent. Even more significant is the following statement from the OWI: "More than one-fourth of all twin-engined and 4-engined aircraft manufactured in 1943 will be transports, and if all the cargo planes expected to be delivered to the armed services in 1943 could be imagined as assembled in a single area, and all taking off simultaneously for the same overseas destination, each of them carrying fuel for a 2,000-mile flight, they could have on board a total of over 20,000 tons of cargo."

Most of these transports will be adaptable to postwar domestic freight carrying. We do not even need to consider converted bombers, because converting them is too much like trying to make an armored bank truck into a highway carrier. In these calculations we have not even considered the possibility of gliders, helicopters and dirigibles. Probably American industry will show its usual aversion to adapting secondhand equipment, so that it would not be surprising to see an entirely new cargo plane. Such a plane will probably have large end-opening doors or hinged sections to permit fast and direct loading.

The present methods of loading cargo into planes have certainly indicated the urgent need for changes in design. In the past, most of this cargo has been stowed in odd-shaped compartments in the front and rear ends of the regular passenger plane. Occasionally cargo is also stowed in the seats and fastened into place, and, of course, on such trips no passengers are carried. In the fall of 1943, several of the leading air lines installed a regular cargo service, but here again an ordinary passenger plane

1. A Douglas C-54 A can hold a big cargo of many shapes and sizes. Weight is the first consideration in commercial air transport because charges are assessed on a ton-mile rate. Every pound of container pays the same charges as the goods.

1



XUM

was used after removing the seats and all interior trim. Floors were reinforced and special webbing was provided to hold the cargo in place. The results, however, were still far from ideal inasmuch as the cargo has to be passed by hand through three different levels to reach the front doorway, and the effect is more like a bucket brigade than a modern materials-handling operation. In fact, many of these people are already planning some day to form the "Ancient Order of Former Package Passers." Essentially this form of loading is only a little different from that illustrated by a 1919 photograph of a four-engined Handley-Page ex-bomber being loaded with freight.

These present methods of loading and stowing cargo make it essential that shippers check very carefully with the air express agency or the air line to make sure that their packages will be of such a size as to get through the doorway and into compartments. The fact that so much handling is necessary mitigates against the use of wooden boxes with their nails and splinters, and even makes the use of metal straps undesirable—in fact, many air lines prohibit the use of metal straps both for the above reason and because of the fact that these straps may injure adjacent cargo or even the interior of the plane. Photographs that have recently appeared to illustrate the loading of cargo planes have indicated that both shippers and air lines instinctively realize that corrugated or solid-fibre containers are much easier to handle. However, the real reasons why the corrugated box is ideal for air freight are its light weight, its relatively low cost, its rigidity, insulation value and resistance to impact—all properties that meet the requirements of the ideal container for this purpose. These properties are even recognized by the Army, which is naturally more interested in performance than in cost. On page 199 of the Army-Navy General Specification for Packaging for Overseas Shipment (U. S. Army Spec. 100-14a; U. S. Navy Spec. 39P16a), the following remarks appear under the subject "Air Transportation":

2. Relative bulk of same quantity of fresh, dehydrated and compressed dehydrated eggs, latter two good for air transport. 3. Waterproof fibreboard and gummed tape make a lightweight packing for this auxiliary fuel tank.



2



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> The following factors must be considered in determining specifications for shipping containers for air shipments:
>
> Lightness
> Strength
> Dimension Limits
> Weather Resistance
>
> In selecting the type of container, the fiberboard box, weather resistant, reinforced, if necessary, should be used whenever the weight and nature of contents permit. Air shipments are generally hand-loaded; for this reason the size of the package should be kept as small as possible and as light as possible to permit handling by one or more persons.

Another testimonial comes from Treasure Island in San Francisco Bay which is now really living up to its name. Treasure Island has been converted into an airport from which transpacific planes take off. Recent trade-journal articles have stated that a crew of expert packaging engineers is stationed there to reduce the package weights without endangering contents. These men examine all incoming shipments, and wherever possible substitute lightweight paperboard containers for the previous weight- and space-consuming wooden boxes and crates. During the month of June, 1943, alone, a total of 27,453 lbs. was saved by this repackaging. That saving is the equivalent of nine clipper cargo loads, and during the past several months the total weight of air shipments has thus been cut by 29 per cent. Division Traffic Manager V. A. Kropff quickly realized that many incoming shipments had been packed for protection against rail and steamship rough handling far in excess of air transport requirements. Probably the most striking conversion job involved a delicate electrical device weighing less than 1 oz.: it arrived in a wooden case weighing 7 lbs., was repacked in cotton in a paperboard box about the size of a package of cigarettes, and arrived at its destination in perfect condition. Since this technique has been adopted, it is stated that no shipment has been damaged or lost on these Pacific air cargo operations due to the container, a fact all the more remarkable

since the repackaging job is done under high pressure, sometimes requiring working all night.

Container regulations for air cargo

The specific rule for packaging air freight will be found in Item 6, Sec. 1 of the Air Express Division Tariff No. 7 of the Railway Express Agency, and it reads simply: "All property shall be so prepared or packed as to insure safe transportation with ordinary care and handling." Also par. 4c of Sec. 1 states that the Express Company "shall not be liable for loss, damage or delay caused by improper or insufficient packing or securing." This would seem to indicate that there are no definite container specifications. In discussing this point with officials of the Railway Express Agency, they agreed that if a package could be delivered to the plane by hand, the specifications need only comply with the above quotation. They point out, however, that most express packages are handled by rail express either before or after the plane flight, and in that case the movement over the rails must conform with Rules 18 and 19 of the Official Express Classification. Rule 19 describes wooden boxes and crates, while Rule 18 describes in detail the construction, sealing and other requirements for corrugated and solid-fibre containers. We were also advised by the Express Agency that in its opinion this rule, or something similar, will continue to apply to the expected increase in postwar air freight even though this freight may not all come under the definition of express. The Railway Express Agency is now handling all the express shipments over American air lines, may be expected to continue its good work after the war.

It is manifestly highly desirable that all the air lines operate under a uniform set of specifications when describing acceptable fibreboard containers. Such a uniform specification has worked out very well for rail freight. There the first rule describing these containers appeared on July 1, 1906, and has been kept, with amendments, in the freight classification ever since. Today it is known as Rule 41, and about 1,000 domestic railroads and steamship lines operate under it. Rule 18 of the Express Classification is essentially the same as Rule 41, except that the Freight Classification permits larger containers, and also permits most packages weighing under 35 lbs. to be "securely wrapped" instead of requiring a box. As a result, today all shippers by freight and express know exactly how their merchandise is to be boxed, and this not only leads to a minimum of loss and damage, but also removes the temptation of trying to get an advantage by shipping in inferior containers.

Unfortunately the motor truck industry has never been able to agree upon a similar uniform set of specifications, so that today each truck line decides for itself what type of containers it will accept—and the results in many instances have not been very gratifying. It would, therefore seem that the present is an excellent time for all the air lines to assure the continuation of a uniform packaging specification in order to avoid a similar situation in the high-pressure competition of postwar.

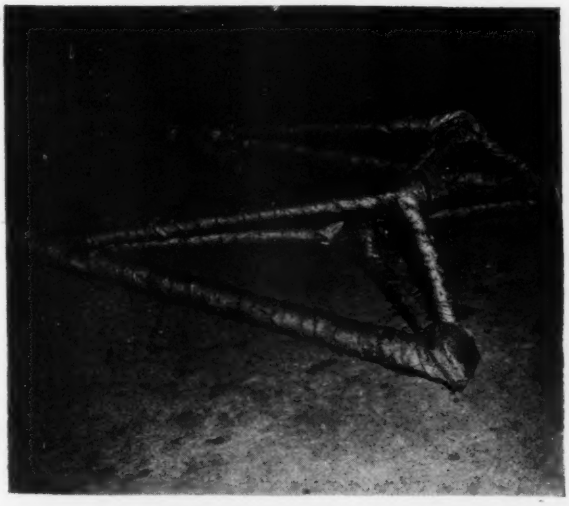
We believe that most shippers, box makers and air line traffic men feel that Express Rule 18 is about as good as anything that could be devised at this time to describe paperboard containers for air shipments. Even if this rule is not perfect, it certainly provides a taking-off point.

The Air Express Division of Railway Express Agency admits that it cannot set up a rigid schedule of maximum package dimensions due to the different makes of planes in service, but as a rough rule they recommend the following maximum dimensions: length 49½ in., width 44 in., depth 18½ in. Packages of unusual shape and size should be checked with the local express agent. For instance, exceptionally long, slim packages can often be "threaded" through the side door.

Density is another factor that should be considered.

4. Airplane landing gear truss wrapped for domestic air shipment. Crate for rail shipment would be 63 lbs.
5. Flowers shipped by air in cellophane examined by Dr. W. T. Pentzer, U. S. Dept. of Agriculture; G. M. Dallas, Railway Express; Edgar McClellan, experimenting florist.

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Most air liners can handle 40 lbs. per sq. ft. of floor space, while some go up to 100 lbs., though the latter figure would only involve commodities of extra-high density. For example, a relatively small box with a base of 37 in. by 16 in. occupies a floor space of 432 sq. in. or 3 sq. ft. This box could carry 300 lbs. without exceeding the 100-lb. limit. Sometimes even heavier shipments are taken by attaching boards to the bottom of the package to increase the area of the package which is in contact with the floor.

What can be shipped by air?

In general, air express will take almost anything that is acceptable by rail. Forbidden articles include explosives, inflammables and acids (unless special permission has been secured), radium, radioactive or magnetic materials (unless specially packaged and located in the plane), motion picture film (unless specially packed) and most live animals. It is interesting to note, however, that certain "inoffensive, non-odorous" animals will be acceptable "when securely packed." In case you might be interested, this list includes horned toads, newts, salamanders and chameleons.

Shippers should also bear in mind the effects of low temperature and reduced pressure in case the plane might have to climb to high altitudes. Cut flowers, fresh vegetables and certain liquids might then be in danger of freezing unless properly protected. Corrugated board, especially in multi-thickness, is an excellent insulation against sudden temperature changes. Low pressures may start leaks in some containers. Therefore, such packages as friction-top cans containing chemicals or liquids are especially vulnerable to high altitudes, and warrant consultation before shipping.

Who ships by air?

During war times, of course, expense is secondary, and all manner of heavy merchandise is then shipped by air in order to keep critical manufacturing operations from risking a shutdown. In normal times, however, speed and valuation are the chief factors in determining when to ship by air. There are many times when it is necessary to rush a shipment—perhaps to meet some specific market such as a special holiday sale—to arrive with the goods in the highest salable condition. Other examples might be out-of-season fruits and vegetables, cut flowers, fashion styles, broadcast transcriptions, motion picture films, newspapers and magazines, and other items where the time limit is important. Valuable merchandise such as jewelry and furs often justifies air freight, and of course with every small reduction in the rates, the volume will show great increases.

In the future we will probably see enormous increase in the shipment of perishables by air freight. For example, fresh fruit and vegetables, especially when out of season, will undoubtedly move from the west and the south to the east with the same planes taking fresh fish from the seaboard to the middle west. All this means that considerable thought must be given to the weight and nature of the container itself. The war has developed many strikingly new container materials. So-called weatherproof or V-board corrugated and solid-fibre boxes are lighter than wood, yet will withstand prolonged contact with water without disintegrating. New wax treatments have resulted in paperboard packages that are already being successfully used for carrying fresh fish surrounded with water ice in place of the former tin boxes. Other familiar examples of this newer development are the Ration K boxes, the various dehydrated food packages, the small arms ammunition container, cylindrical paper shell tubes and many other lightweight paperboard packages developed under the high pressure of military requirements to reduce weight and substitute paperboard for critical wood and metal. Many of these new developments will certainly persist after the war and be adapted to civilian requirements.

Dehydrated foods are certainly here to stay. Because of their light weight and concentrated valuation, they form an excellent cargo for plane transportation. This is especially true because of the enormous reduction in cargo space that has been effected by dehydration and then further reduced by compression into tablets. In general, dehydration alone saves from 75 to 90 per cent in weight and from 50 to 90 per cent in space. When the dehydrated product is further compressed into tablets, an additional saving of about 50 per cent is effected.

Cost of air freight

Of course, the real factor which will always keep the preponderance of freight on the rails is the unavoidably high cost of air freight. It should not be necessary to analyze here the reasons for these high rates as they are self-evident. They will, of course, come down in the future, but their levels must always stay high as compared with rail traffic. Thus at present it actually costs more to ship 100 lbs. of express by air than 100 lbs. of passenger, due to the extra expenses incurred before take-off and after landing. In general, air freight runs about 80¢ per ton-mile, but an advertisement run by a plane manufacturer in the *Saturday Evening Post* for September 18, 1943, carried the headline: "Prediction:—Postwar freight will fly at less than 15¢ a ton-mile." By contrast, rail freight is traveling at slightly less than 1¢ per ton-mile. This relatively high rate for air cargoes emphasizes once more the need for lightweight containers.

Statistics quoted above need raise no fear of the railroads losing any appreciable freight business to the airplane. Thus the 1942 movement of 20,000 tons of air express if multiplied by 100 would still be only 0.1 per cent of the freight ton-miles now carried annually by American railroads. In this connection it is also interesting to note that for the five years 1935–1940, the average income of U. S. air lines was made up 95 per cent from passenger and mail and only 3 per cent from express and freight. Instead, the air cargoes of the future will probably be items such as perishables where speed is worth the extra cost. In the words of Mr. Tom Girdler, speaking over the radio in October, 1943: "Goods shipped by air are goods which otherwise might not have been shipped at all."

Packing for export

by J. D. Malcolmson

Because of the need for conserving space in PACKAGING CATALOG, this article will of course not attempt to make a thorough coverage of this subject, but instead will touch on some of the outstanding points and direct the reader to sources of more detailed information. These sources will be found in the bibliography at the end of this article. Particular attention is called to Chapter J of the Bonnell manual which includes 40 pages of very valuable and concise information on this subject.

In considering packaging for domestic shipments, the problem is somewhat simplified by the existence of the uniform packing requirements itemized in the Consolidated Freight Classification which applies uniformly to all of the railroads, many of the coastwise steamship lines and many of the motor carriers. Unfortunately this condition does not exist for trans-oceanic shipments, as not even the efforts of the North Atlantic Conference have succeeded in developing uniform packing methods.

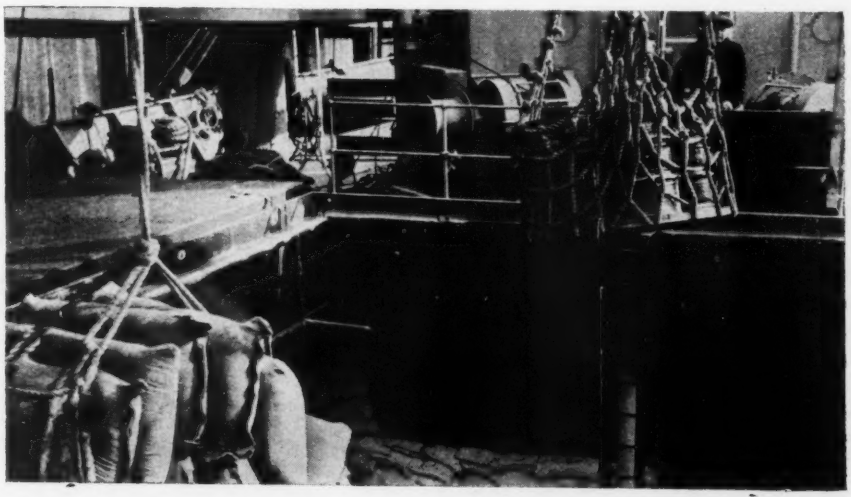
Export shipments during normal times

It is a sad but well-known commentary on American industry that we have paid a great deal less attention to export packaging methods than most of our foreign competitors. This is undoubtedly due to the fact that the average American manufacturer had enough domestic business to keep him interested, and his export shipments, if any, were left more or less to chance.

Our chief trouble in the past has been a failure to foresee the much more severe treatment which export packages receive as compared with domestic shipment. This includes loading onto the ship, stowage in the hold, exposure to shifting cargo and damp atmospheres on the voyage, unloading of the ship—in many cases by unskilled labor perhaps with lighters, and, finally, transportation to destination by every conceivable means. Still another hazard is the amazing ingenuity shown by natives of many foreign countries in pilfering part of the contents without leaving any evidence on the outer container. The U. S. Department of Commerce has suggested that the following points be kept in mind:

1. The nature and value of the article.
2. The unloading facilities at destination.
3. The inland transportation system in the country of destination.
4. The climatic conditions en route and in the country of destination.
5. The amount and nature of trans-shipping that may be required en route to the final port.
6. The probable pilferage owing either to nature of goods or the country of destination.
7. The Consular rules and regulations and custom duties of the country of destination.
8. Other special conditions determined only through actual knowledge of conditions in the particular country of destination.

For instance, some countries may assess import tariffs on the gross weight or on the legal weight, or on the tare weight. Thus, if the tariff is assessed on the gross weight, it is naturally very important to make the lightest weight container that will carry safely. One of the largest manufacturers of electric refrigerators not long ago reported that one of the South American countries assessed tariffs on the gross weight and these were payable in gold. By changing the outer container from a heavy wooden crate to a sturdy fibreboard container with adequate interior protection, the reduction in gross weight effected a savings of $10 per refrigerator in custom duties. It should also be borne in mind that ocean-freight rates are calculated not only on the weight but also on the cubic space occupied, so that it is very im-



Proper packing and packaging for export especially important during wartime, will continue so postwar. Packed for export are these supplies for our armed forces and for our allies. Drums of vegetable oil are here lowered into the hold together with 100-lb. sacks of vegetable seeds. Below are export bags and boxes of various descriptions which this merchant ship will carry to theatres of war. Photo U. S. D. A., by Knell.

portant to knock down merchandise to the greatest possible extent.

The proper marking of export packages does not sound complicated, but many shippers fall down on this point more through ignorance than carelessness. Your insurance company, or even the American Consular representative, can usually offer good advice, and on page 234 of *Bonnell's Manual* there is a table showing most of the common caution markings such as "This Side Up" translated into Spanish, French, German and Portuguese. Many foreign countries also require the gross, tare and net weights to be shown in metric figures. A valuable booklet in this connection is the *Units of Customary and Metric Measure* issued by the Department of Commerce as Publication No. M 121. These tables will save an enormous amount of figuring.

Export shipments during war times

War times always accelerate technological developments and shipping methods are no exception. During the last war the Forest Products Laboratory at Madison, Wis., made some almost unbelievable savings possible in cargo space and tare weights in the overseas shipment of artillery wheels and nearly every other commodity required by the Ordnance Department. Naturally much of this development endured through application to peacetime shipments, and of course the past 20 years of peace have also shown great improvements in export packaging. It is quite evident, however, that we still have a long way to go before we reach the ultimate in such developments, and this present war has already started to accelerate our knowledge of shipping methods. As a matter of fact, the problems this time are probably 100 times greater than in the past war due to the fact that in this war it is necessary to ship equipment all over the world under every form of transportation including cargo planes.

For instance, certain Army clothing which was formerly packed in fibre and wooden cases is now being compression baled with a space saving of 35 per cent. Shovels which were formerly shipped in wooden crates are now being simply strapped together with wire saving 20 per cent in space. A field range stove for the Army which was formerly shipped in a double crate is now being shipped in a newly designed single crate saving seven per cent in space. Army garbage cans formerly shipped separately in individual crates are now nested together in a lighter crate adequate for six cans with a space saving of 60 per cent. Army shoes which were formerly packed in individual cartons are now being bulk packed with a saving of 25 per cent. Machine guns formerly shipped one to a box are now shipped two to a box with a space saving of 35 percent. This list could be extended indefinitely but it simply illustrates the urgent need of conserving every possible cubic inch of cargo space in order to offset the delays due to shipping all over the world and to combat the submarine menace.

Already, during the present war, technicians are far ahead of what they did in the last war. Thus, the Forest Products Laboratory has made enormous increases to its staff of packaging engineers and in addition is now operating a five-day course in training shipping men, and it is expected that the course will continue to run indefinitely. It is limited to a total of 35 men in any one week. The Containers Branch of WPB is also adding to its specialists in packaging, and the War Department is now planning to station packaging experts at unloading points all over the world. These special military units will be known as port battalions.

The crying need during wartime is to deliver merchandise in undamaged condition but at the same time to conserve every possible pound of weight and cubic inch of cargo space. For example, millions of cases of canned goods have been shipped to England on Lend-Lease and to the American Army abroad in "weatherproof" solid fibre boxes. These special boxes will withstand weeks of total immersion in water without disintegration and at the same time furnish very large savings in weight and cargo space. Cargo space is further conserved by filling in all remaining spaces in the hold with cases of canned goods or similar small packages. Trucks are now seldom loaded onto a ship empty as the truck body itself is being used to carry merchandise. The same idea can be extended almost indefinitely.

Another point that has to be kept in mind by all exporters is the fact that modern machinery and military equipment is made to far closer tolerances than in the last war. Thus, an unbelievable number of items such as airplane engine parts are now being made to tolerances of .0001 in. This means that the slightest amount of rusting of such a part renders it worthless. One of our military observers recently reported that he had seen a tragic sight in Egypt, namely, a large delivery of American airplane engines and parts which had rusted to the point that they were worthless even though most of us would not have considered this amount of rust as serious. Shippers of such items have accordingly developed most ingenious methods of protection.

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The following list of references is not intended to be complete but should furnish a fairly good start on the subject:

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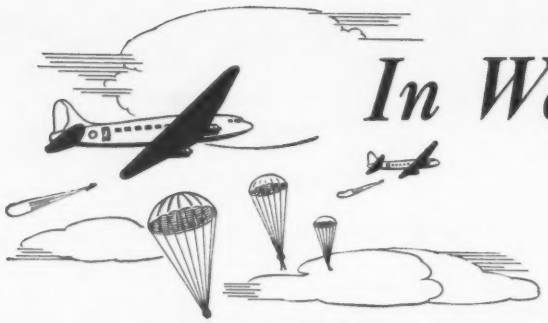
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XUM

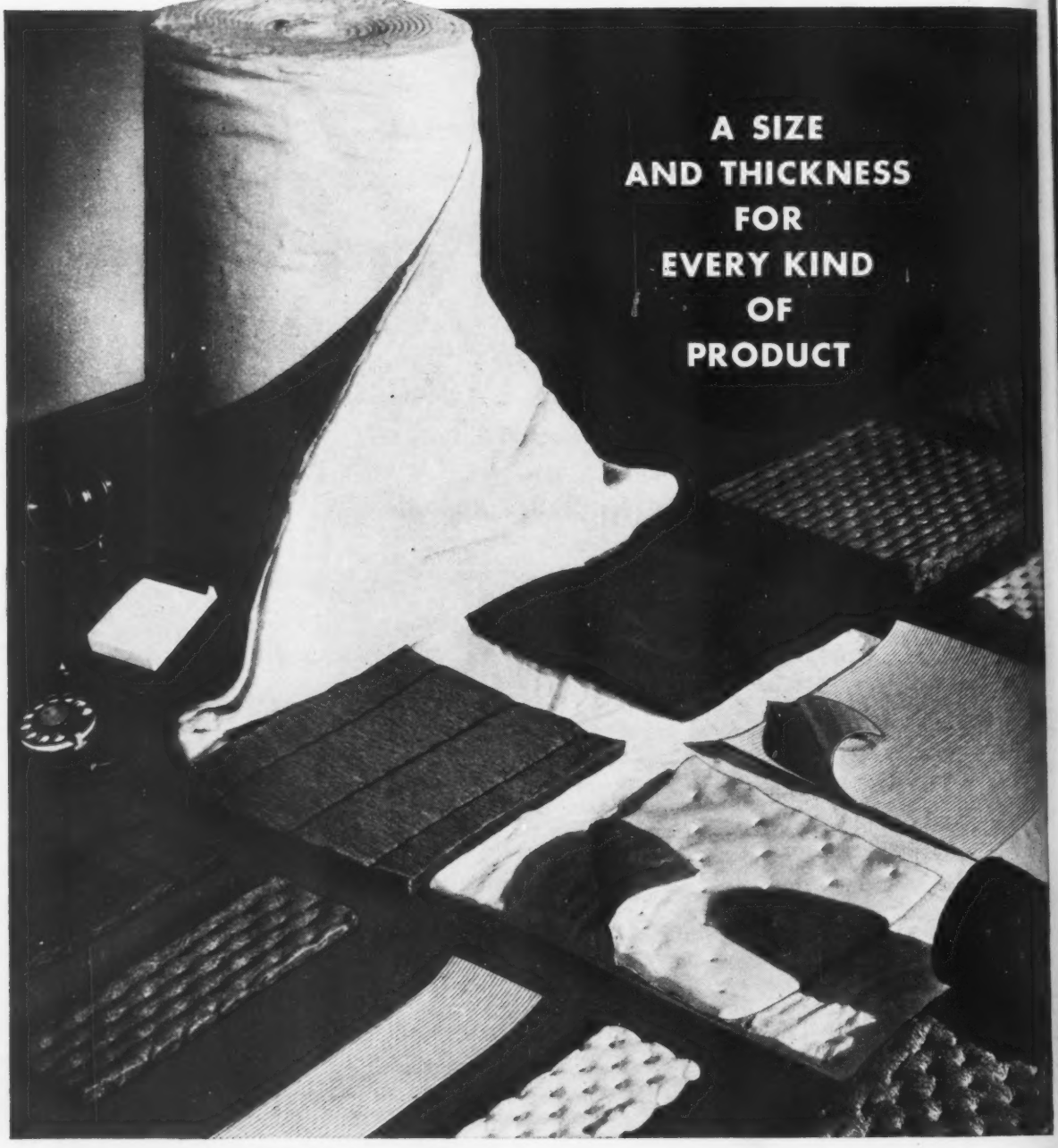

Gair by Air
One half million planes will be in active service by
1950, reports the Civil Aeronautics Adminis-
the future will go by air—Gair con-
tainers have proven to be ideal where
weight is the first consideration
. . . Consult our engineers
Robert Gair Company, Inc.
New York—Toronto
White for comprehensive
booklet "AIR CARGOES."
Save Waste Paper
for War Production.
GAIR
FOLDING CARTONS • BOXBOARDS • FIBRE & CORRUGATED SHIPPING CONTAINERS

XUM



In War as in Peace—

Safeguards the



★ ★ ★ ★ ★ ★ ★ ★ ★ **KIMPAK IS A**

Kimpak *Creped Wadding*

REG. U.S. PAT. OFF. & FOREIGN COUNTRIES

Shipping of a Nation



PROTECTION IN WAR

It's not enough to make precision implements of war. Precision *packing* is required, too. For each and every shipment must reach its destination without damage . . . in spite of all shipping hazards.

That's why...today...in defense plants throughout the Nation...KIMPAK* is widely used for packing war products of all kinds. In each KIMPAK sheet or strip or pad or roll, a million tiny air-cell "shock absorbers" cushion the jars and jolts that so often cause damage while shipments are in transit.

It doesn't matter what you make or what material it's made of . . . glass, metal, plastic, wood. It may be light or heavy, large or small...anything from a tiny detonator cap to a huge airplane wing. KIMPAK provides the packing safeguard that it needs.

KIMPAK comes in every wanted size and form and thickness. One or more of these is sure to meet your needs. It's inexpensive and saves both packing time and money in your shipping room.



PROTECTION IN PEACE

Long before the war, manufacturers were quick to learn that aside from *protecting* shipments, KIMPAK also helped boost sales. This luxurious, soft wrapping adds to the appearance of *any* package. And as everybody knows, appearance *IS* an impelling sales force. In addition, KIMPAK often reduces the over-all dimensions of the package, thereby saving vital shipping space in trucks and trains and ships. There is even a special moisture-*resistant* KIMPAK, and a moisture-*absorbing* type that can absorb *more than 16 times its weight in liquids!* Moisture-absorbing KIMPAK is often specified when protection from leakage of containers is required.

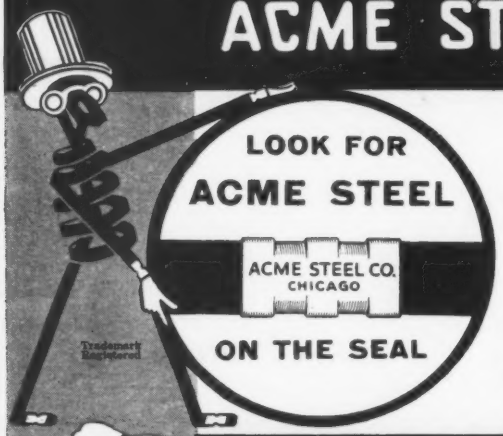
Should any of the standard forms of KIMPAK fail to suit your purpose, simply call in a Kimberly-Clark packaging engineer and state your problem to him. KIMPAK probably can be made to fit your specific needs.

But get *all* the facts. You'll find them in KIMPAK's latest illustrated Book. Send for your copy of this Book that shows how to save time and money in your shipping room...that explains the modern way to pack. Read this Book carefully. Then file for future reference. Write to Kimberly-Clark Corporation, Creped Wadding Division, Neenah, Wisconsin. Do this today... before you forget.

**KIMPAK (trade-mark) means Kimberly-Clark Wadding*

KIMBERLY-CLARK CORPORATION PRODUCT

ACME STEEL COMPANY

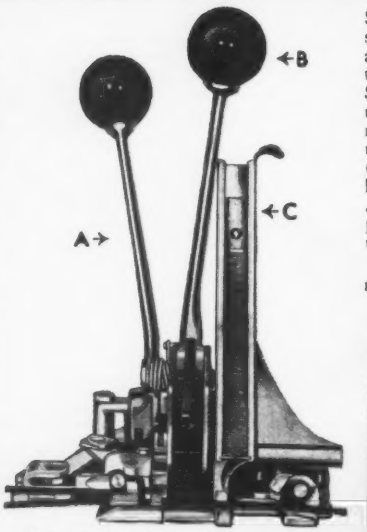


General Offices:
2834 Archer Avenue, CHICAGO 8

603 Stewart Ave. S.W., ATLANTA
339 St. Paul Pl., BALTIMORE 2
146 Summer St., BOSTON 10
712 Book Tower, DETROIT 26
4901 Pacific Blvd., LOS ANGELES 11
309 Magazine St., NEW ORLEANS 12
103 Park Avenue, NEW YORK 17
201 Lafayette Bldg., PHILADELPHIA 6
432 Bryant St., SAN FRANCISCO 7
1025 Sixth Ave., S., SEATTLE 4

ACME STEEL COMPANY of Canada, Ltd.
369 St. Paul St. W., MONTREAL
16 Church St., TORONTO
990 Station St., VANCOUVER
Natl. Cartage Whse., WINNIPEG

Acme Steelstrappers TO SPEED UP STRAPPING



This tool is only one of the many Acme Steelstrap tools and accessories which comprise the most complete line of strap-applying equipment available.

(A) One stroke of this lever tensions the strap and automatically feeds a seal into the sealer jaws.

(B) One stroke of this lever seals the joint and automatically cuts the strap from the coil.

(C) This magazine holds 100 seals . . . saves the time required to feed 100 seals by hand.

Speed—economy—security—all these are possible with Acme Steelstrappers . . . the fastest seal-fed strapping tools yet developed. With a single stroke—this equipment tensions, seals and cuts strap, using two convenient levers. This speedy equipment combined with Acme Steelstrap means faster operation, lower costs and maximum protection on packs that are "Bound To Get There" — Acme Steelstrap meets all Federal Strapping Specifications. It is used to reinforce all types of shipments, both domestic and overseas . . . cartons, boxes (wooden or fibre), crates, bundles and skids. Smaller packages can be bundled into single units with Acme Steelstrap to speed handling . . . prevent loss and pilferage . . . reduce express charges. On large packs, Acme Steelstrap saves time and material . . . permits additional economies by reducing weight.

We will be glad to study your packing and shipping problems and make recommendations without obligation. Use convenient card attached.



Acme tools and accessories speedily apply Steelstrap to the entire range of shipping packs. Precision machined and constructed, Acme equipment is built for service and is easily operated. There is a type for every strapping job. The one best suited for your needs is determined by the nature of the item strapped and by conditions under which products are packed.

ACME STEELSTRAP MEETS ALL FEDERAL STRAPPING SPECIFICATIONS.

MOST WIDELY USED SIZES

Width	Thickness	Feet Per Lb.*	Lbs. per 1000 Feet*
¼	in. x .015 in.	78.55	12.73
⅜	in. x .015 in.	52.36	19.09
½	in. x .015 in.	39.26	25.46
½	in. x .020 in.	29.45	33.96
⅝	in. x .015 in.	31.41	31.84
⅝	in. x .020 in.	23.56	42.44
¾	in. x .015 in.	26.18	38.20
¾	in. x .020 in.	19.63	50.94
¾	in. x .023 in.	17.07	58.58
¾	in. x .035 in.	11.25	88.88
1¼	in. x .035 in.	6.73	148.58
1¼	in. x .050 in.	4.72	211.86
2	in. x .050 in.	2.94	340.13

* Approximate only

ACME *Unit-Load* BANDS

FOR CARLOAD AND LCL SHIPMENTS

Eliminate unnecessary and costly bracing materials . . . speed up loading and unloading operations . . . load more material into cars . . . reduce freight charges by lessening tare weight—save labor costs. These are just a few of the advantages of the Acme Unit-Load Process. In addition, damage claims are virtually eliminated and goodwill is protected.

The Acme Unit-Load Process is a quickly applied flat steel band method of bracing carload freight . . . straight and mixed loads . . . car doors . . . pool and stopover cars. Hundreds of shippers have taken advantage of Unit-Load benefits to step-up shipments as well as to make important savings.



Shipments are made "Bound To Get There"... held in the grip of strong steel bands . . . securely tensioned and sealed around units of freight. When cars are braced with Acme Unit-Load Bands, it takes only one snip of each strap to remove the lading.

GET COMPLETE FACTS

SEND THIS POSTAGE FREE CARD

FREE
FOLDER ACME
Silver Stitcher

Name_____

Address_____

City_____ State_____

CHECK HERE FOR INFORMATION ON ACME *Steelstrap*

Postage
Will be Paid
by
Acme Steel
Company

No
Postage Stamp
Necessary
If Mailed In
United States

BUSINESS REPLY CARD
First Class Permit No. 606, Sec. 510 P. L. & R. CHICAGO, ILL.

ACME STEEL COMPANY

2840 Archer Avenue

Pilsen Station

CHICAGO 8, ILL.

BOXES AND CARTONS SEALED FASTER, EASIER WITH ACME *SilverStitchers*

WHAT USERS SAY . . . "Saves two operations," says one general superintendent — "Cuts cost 15%," writes the president of a prominent manufacturing concern—"Increased shipping output at least 50% and cut cost of staples"—these are comments from a few of the long list of users . . . satisfied for one reason only —because they get results . . . the kind of results you, too, can get with Acme Silverstitchers.

Acme Silverstitchers were made to replace old-fashioned sealing methods—assure stronger cartons because sealing by stitching means greater holding power and a neater job with less mess and bother. These machines matched with Acme Silverstitch Stapling Wire make a perfect combination—made to give lasting satisfaction, year after year.

(SEND ATTACHED CARD FOR FREE FOLDER.)

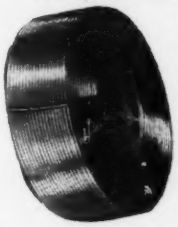
AVAILABLE IN STANDARD AND SPECIAL TYPES: The Straight Arm Silverstitcher is a heavy duty stitcher designed for fast stitching of sides and ends of many types of packs. The Bottom Silverstitcher is designed for low-cost, smooth, positive bottom stitching. Combining the straight arm and bottom stitching units in one machine, the Combination Silverstitcher is the all-around stitching equipment. Seam, top and stitchers for special applications are also available.

ACME *SilverStitcher* FEATURES

Adjustable single pedal control • Few moving parts mean lower maintenance costs • Vital parts are reversible • Low power consumption • Heavy duty construction for long service • Silent V belt drive • Wide, comfortable foot rest treadle • Resilient one-piece feed wheels • Handles two gauges of Silverstitch without adjustment • Conveniently placed starting and stopping toggle safety switch • Over-feed with adjustable spring tension and unique wire friction plug provide constant and even flow of wire • Extra long life of main drive anti-friction bearing assured by use of genuine Promet bronze • Mechanism guarded for maximum safety • Individual parts are precision made and are interchangeable • Friction brake spring maintains continual pressure on clutch hub and simplifies brake adjustments • Easy to operate . . . runs smoothly and quietly • Efficient • Modern • Economical • Guaranteed.

ACME *SilverStitch*

FOR SPEED AND ECONOMY IN STAPLING



Stapling is faster—more boxes can be stitched per day with Acme Silverstitch Stapling Wire. Uniform in temper, width and thickness. There are fewer stops for coil changes as Acme Silverstitch is supplied in *one piece*—five and ten-pound coils. Acme Silverstitch is rust-resisting . . . assures extra strong stitches that clinch and stay tight . . . Silverstitch is packaged for your convenience.

Width	Thickness	Feet Per Lb.	1" Staples Per Lb.	1¼" Staples Per Lb.
.103 in.	.014 in.	211	2530	2020
.103 in.	.017 in.	175	2100	1680
.103 in.	.020 in.	148	1780	1420
.103 in.	.023 in.	129	1550	1240
.060 in.	.024 in	222	2665	2130
.060 in.	.0205 in.	260	3120	2500

ACME *SilverStitcher* SPECIFICATIONS

STRAIGHT ARM SILVERSTITCHERS are available in four throat sizes—12", 20", 25" and 30". These figures indicate the maximum carton depths which can be accommodated and represent the distance between the front of the frame and the clinching point. The size required is determined by the depth of the container or the nature of the article to be stitched.

Distance from floor to top of arm (clinching point): On 12" size—44"; on 20" size—46"; on 25" size—46"; on 30" size—48".

Distance from top of base to top of arm (clinching point): On 12" size—40"; on 20" size—42"; on 25" size—42", on 30" size—44".

Sizes of Silverstitch used — all standard sizes which include .014, .017, .020, .023; .060 x .024 and .060 x .0205.

Width of crown of standard staples: On 12" size—7/16"; on 20", 25"and 30" sizes—½".

Motor: ¼HP single-phase long hour duty; 110 or 220 volt, 60 cycle, A.C. Other voltage, current and phase required, available at slight additional cost.

Speed: Depending upon application and dexterity of operator, speed is set before leaving factory at any one of the following approximate number of staples per minute—170, 200, 230, 260 and 285. If speed is not specified, stitcher is set for about 230 staples per minute.

Diameter of silent action V belt driving pulley . . . 14".

Floor space required:

On 12" size—20" x 36"; on 20" size—22" x 44"; 25" size — 24" x 44"; on 30" size — 22" x 50".

BOTTOM SILVERSTITCHERS are available in three throat sizes — 12", 20" and 25". These figures represent the distance between the front of the frame and the clinching point in stitching position.

Maximum dimensions of packs handled on 12" size—24" x 24" x 40"; on 20" size—40" x 20" x 42"; on 25" size—50" x 50" x 42".

Distance from floor to top of post (clinching point): On 12" size—44"; on 20" size—46"; on 25" size—46".

Distance from top of base to top of post (clinching point): On 12" size—40"; on 20" size—42"; on 25" size—42".

Sizes of Silverstitch used — all standard sizes which include .014, .017, .020, .023; .060 x .024 and .060 x .0205.

Width of crown of standard staple . . .½".
Motor: ¼ HP single-phase long hour duty; 110 or 220 volt, 60 cycle, A.C. Other voltage, current and phase required, available at slight additional cost.

Speed: Depending upon application and dexterity of operator, speed is set between 170 to 285 staples per minute. If speed is not specified stitcher is set for about 230 staples per minute. This will handle the complete range mentioned above.

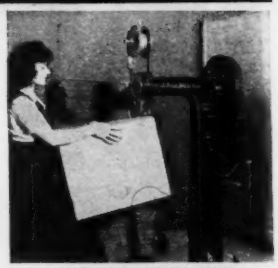
Diameter of silent action V belt driving pulley . . . 14".

Floor space required:

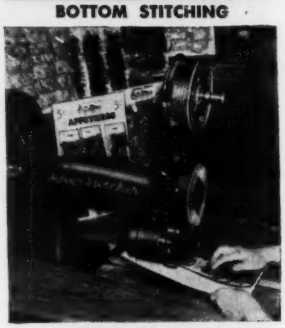
On 12" size—20" x 40"; on 20" size—22" x 48"; on 25" size—24" x 52".

COMBINATION SILVERSTITCHERS are available in three throat sizes—12", 20" and 25".

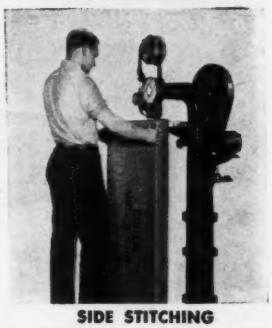
Width of crown of standard staple—½". Other specifications same as those above.



BOTTOM STITCHING



BAG STAPLING



SIDE STITCHING



BAG SEALING



END STITCHING











Floquil

A STROKE *and* IT'S DRY

THREE NEW MARKING METHODS

Roller marking overseas shipments
Roller obliterating . . . . .
Roller stenciling . . . . . .

FAST • CLEAN • SIMPLE • PRACTICAL

Use Floquil Products in your own Shipping Room. You will be convinced that:

Floquil Opaque and Transparent Marking colors are weather-proof and abrasion proof. They may be applied to wet or dry surfaces during any weather conditions. They dry immediately and are smear proof.

Floquil Opaque Marking Colors, furnished in white, black and eight approved service colors for making overseas shipments, are used for stenciling, striping, cornering, with Floquil Roller Marking devices.

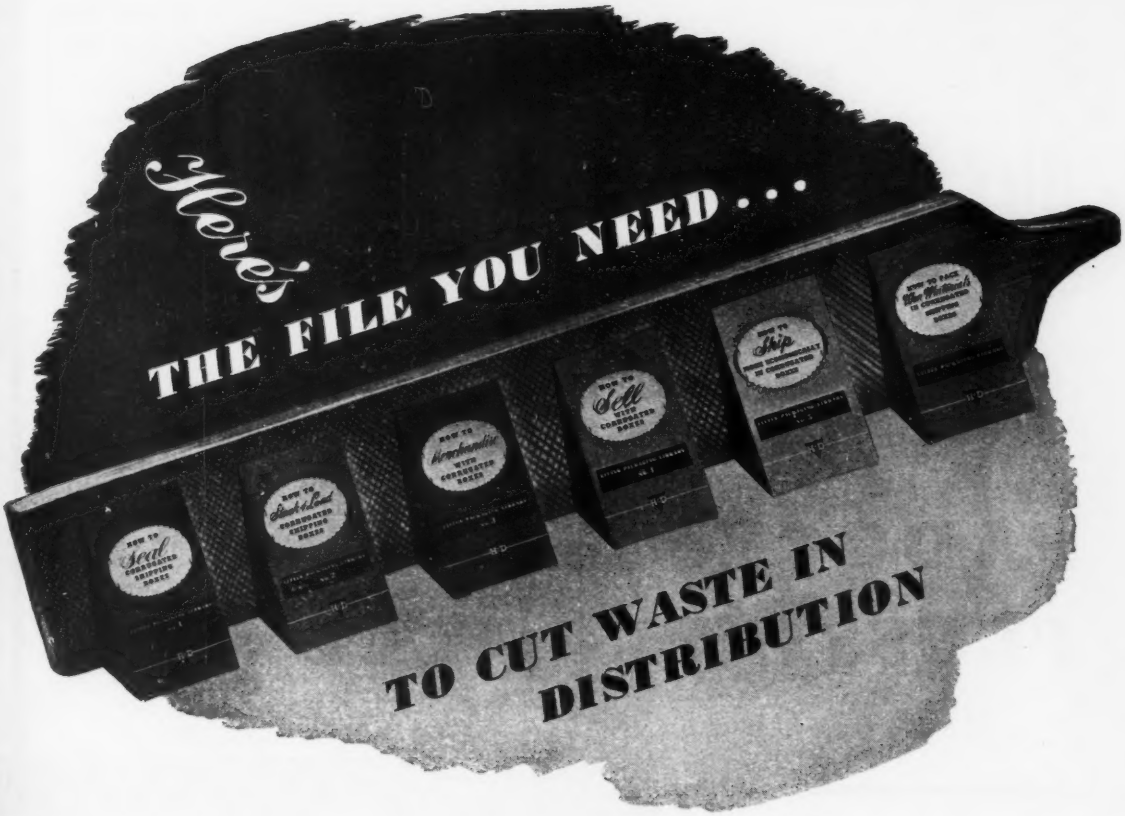
Floquil Fountain Marking Pens mark without pressure. Made of sturdy, non-inflammable plastic, light-weight, simple, have no moving parts, nothing to get out of order. Various special nibs available for marking packages, rough surfaces; for making labels and shipping tickets.

Floquil Transparent Marking Colors, available in black and six colors, are permanent, weather-proof and smudge-proof, A STROKE AND IT'S DRY. May be used with Floquil Roller sets, Floquil Marking Pens and Roller stenciling.

Write for illustrated folder showing uses in famous named plants.

FLOQUIL MARKING COLORS & DEVICES
Distributors in Principal Cities

FLOQUIL PRODUCTS, Inc.
DEPT. MP • 1974 BROADWAY • NEW YORK 23, N. Y.



IT'S HANDY . . . it's helpful . . . it has dozens of applications in hundreds of businesses. It will help you smooth out rough spots in packing, shipping and distribution, give you an edge in efficiency.

There's no time like the present to make use of this tool. The enormous load being carried by the railroads means inevitable waste of materials, machinery, manpower and transportation facilities. That waste can be curtailed only if every manufacturer takes immediate steps to improve shipping methods.

The first step is to send for this complete file of packaging "text-booklets." Every man in your organization who is concerned with shipping and distribution will find this "refresher course" in packaging a definite aid in locating and correcting many of his problems. Write for as many sets as you need . . . they're yours for the asking, FREE, without obligation.

Protect the Product

BETTER SEE H&D AUTHORITY ON PACKAGING

HINDE & DAUCH *Executive Offices: 4439 Decatur Street, Sandusky, Ohio*

FACTORIES in Baltimore • Boston • Buffalo • Chicago • Cleveland • Detroit • Gloucester, N. J. Hoboken • Kansas City • Lenoir, N. C • Montreal • Richmond • St. Louis • Sandusky, Ohio • Toronto

FIRST OF ALL . . .

BUY U. S. WAR BONDS AND STAMPS

★ ★ ★

Safeguard Your Product by Wrapping in a Sweetone Protective Paper—

PADOCEL
FLOSSINE

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PADOCEL

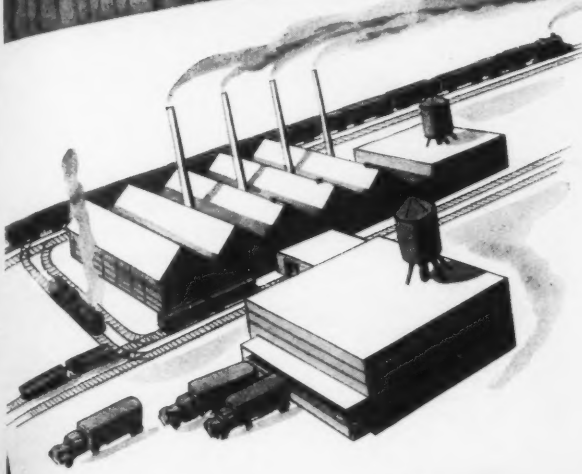
- Globular Parchment
- Corrugated Parchment
- Waxed Layer Board
- Box Partitions
- Box Linings
- Box Dividers
- Glassine
- Waxed Papers
- Layer Cards
- Tissues
- Special Wrappings
- Embossed Papers
- Shredded Papers

It is of vital importance to protect and save your products in these critical times when labor and raw materials must be used for maximum production with minimum loss. Sweetone Protection Papers will go far in acccomplishing this all important job.

SWEETONE PAPER PRODUCTS

GEORGE H. SWEETNAM, INC.
Specialists in the Packaging Field
282-288 PORTLAND ST. CAMBRIDGE, MASS.

STENCILED SHIPMENTS ROLL FASTER



YOUR SHIPMENTS ARE IMPORTANT

STENCIL ADDRESS YOUR SHIPMENTS with easily read, permanent stenciled markings —**they'll roll faster, and costly delays in transit will be eliminated.**

DIAGRAPH-BRADLEY manufactures a stencil cutter for every shipper's need.

Machines are available for cutting letters ½", ¾", ⅞", 1¼," 1½" & 1¾".

Most government export shipments require stenciling in letter size 1½" or larger.

DIAGRAPH-BRADLEY is the only manufacturer making a stencil machine for cutting letters larger than 1".



FOR BEST RESULTS USE

- D-B Inks
- D-B Stencil Board
- D-B Fountain Marking Brushes
- D-B Fountain Marking Pencils

COMPLETE SHIPPING ROOM SUPPLIES

D-B DIAGRAPH-BRADLEY

STENCIL MACHINES

DIAGRAPH-BRADLEY STENCIL MACHINE CORPORATION
NO. 56 DIAGRAPH-BRADLEY BUILDING
ST. LOUIS, 8, MISSOURI
DISTRIBUTORS IN PRINCIPAL CITIES

World's Oldest and Largest Manufacturer of Stencil Machines

XUM

SEYBOLD *Morrison*

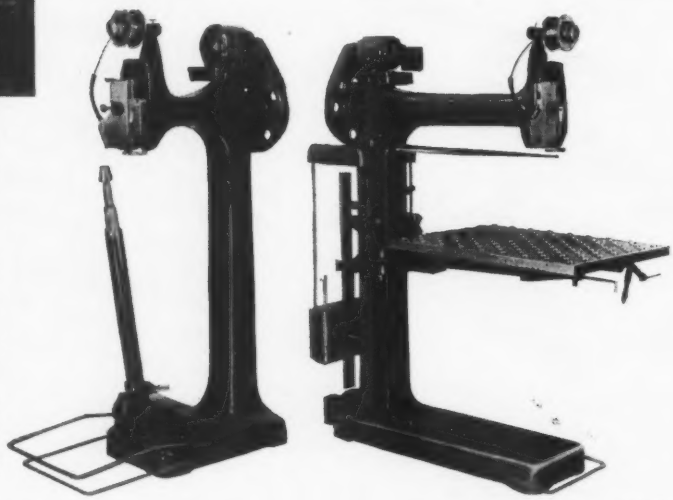
WIRE STITCHING MACHINES



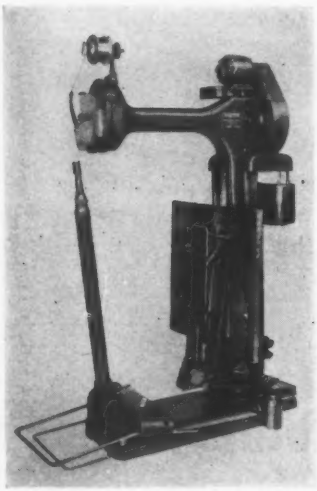
Assembling and sealing corrugated and solid fibre containers with SEYBOLD *Morrison Wire Stitching Machines* speed packaging operations and reduce packaging costs appreciably in comparison with other methods. These heavy duty machines are equipped with the exclusive and patented Type-SL Stitcher Head. Complete information will be furnished promptly but actual shipments are subject to U. S. Government wartime regulations.

BOTTOM STITCHING

(Above) Bottom stitching corrugated containers on the SEYBOLD *Morrison Wire Stitching Machine* illustrated at right. Designed in two models: Model SLH with 15" throat and Model SLJ with 25" throat. Where required, an arm can be installed to make the machine a combination "Arm and Bottomer."



Morrison Wire Stitching Machines are designed in two models: Model SLM with 25" throat and Model SLP with 33" throat. Equipped with blade anvil arm and quickly adjustable roller top table, as illustrated.



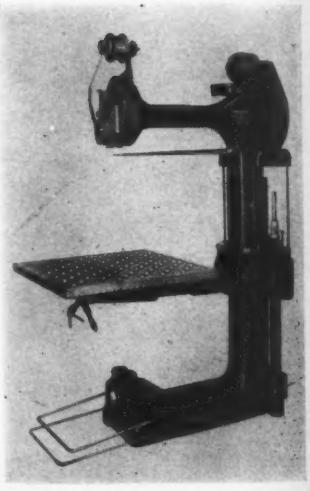
COMBINATION TOP AND BOTTOM SEALER

(At left) SEYBOLD *Morrison Combination Top and Bottom Stitching Machine* set up for bottom stitching with blade anvil folded down, counterbalanced roller top table up, and clincher post in position.

(At right) The same machine set up for top sealing. This type of unit is designed in two models: Model SLQ with 25" throat and Model SLR with 33" throat.

OTHER TYPES OF MORRISON STITCHERS

The complete line of SEYBOLD *Morrison Wire Stitching Machines* includes 15 standard models of bottom stitchers, top sealers, combination units, side seamers, and arm machines in a wide range of sizes and practical throat depths to meet practically all standard requirements.



SEYBOLD DIVISION

Harris · Seybold · Potter Co. • *858 Washington Street, Dayton, Ohio*

SEYBOLD SALES AND SERVICE

New York:
E. P. LAWSON CO., INC.
438 West 33rd Street

Chicago:
CHAS. N. STEVENS CO., INC.
113 West Harrison Street

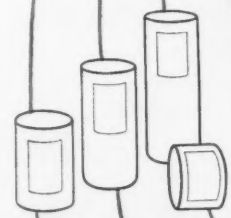
Detroit, Michigan:
CHAS. A. STRELINGER CO.
149 East Larned Street

Southern Sales District:
HARRIS-SEYBOLD-POTTER CO.
220 Luckie St., N.W., Atlanta, Ga.

West Coast Distributor:
HARRY W. BRINTNALL COMPANY
San Francisco, Los Angeles, Seattle

Canadian Distributor:
HARRIS-SEYBOLD-POTTER (CANADA) LTD.
Toronto and Montreal

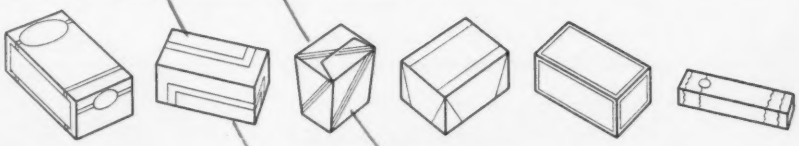
Gaylord Boxes



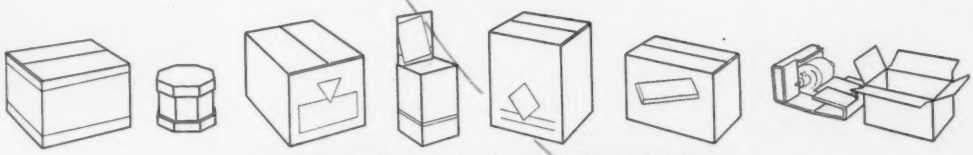
KRAFT PAPER AND
KRAFT SPECIALTIES



KRAFT GROCERY BAGS AND SACKS



FOLDING CARTONS



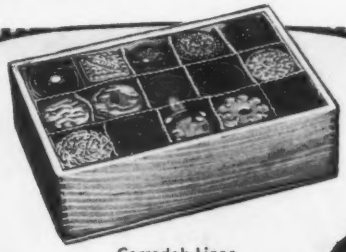
CORRUGATED AND SOLID FIBRE BOXES

GAYLORD CONTAINER CORPORATION, General Offices: SAINT LOUIS

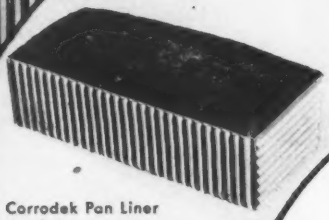
New York • Chicago • San Francisco • Atlanta • New Orleans • Jersey City • Seattle • Indianapolis
Houston • Los Angeles • Oakland • Minneapolis • Dallas • Jacksonville • Columbus • Tampa
Fort Worth • Detroit • Cincinnati • Des Moines • Oklahoma City • Portland • Greenville
San Antonio • Memphis • Kansas City • Milwaukee • Bogalusa • Weslaco • Greensboro

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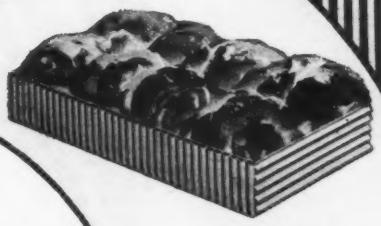
CORRODEK *Protective Strength for Packaged Products*



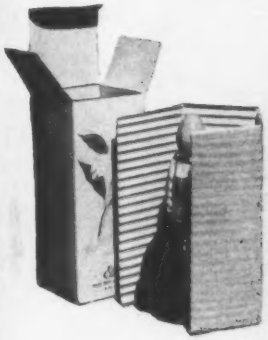
Corrodek Liner for Cookies



Corrodek Pan Liner for Cakes



Corrodek Liner for Sweet Goods

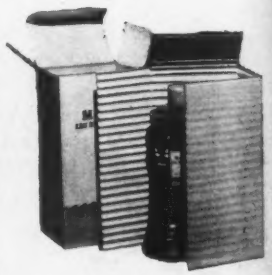


Corrodek Box Liner

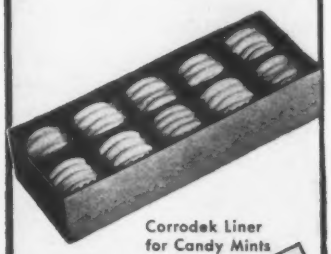
Packaging Engineers, like Construction Engineers, know the importance of the arch. In our bridges it safely carries the endless flow of daily commerce . . . in Corrodek it safely carries packaged products to their ultimate consumers. For, in Corrodek, the arch has been precisely formed as endless corrugations, to resist and cushion the many hazards of shipping and selling. Corrodek also furnishes colorful eye-appeal that wins friends and buyers.

Corrodek simplifies your planning, for it is available in many types of papers . . . in any size or shape . . . in pads or strips, or die-cut to your needs . . . with economy that keeps costs low.

You will increase the sales of your present package by using colorful Corrodek, the "Economy-Plus" material that combines strength and eye-appeal. Try it and see the difference! Ask for a free sample kit . . . or let us send you suggestions to fit your present package.



One-piece Die-cut Corrodek Liner



Corrodek Liner for Candy Mints



Corrodek Strip Liner for Cookies

BUY U.S. WAR BONDS

SHERMAN

PAPER PRODUCTS CORPORATION

Newton Upper Falls 64, Massachusetts

Branch Factory: Los Angeles, California *Branch Warehouses:* New York, New York • Chicago, Illinois

1937 - 38 - 39 - 40 - 42

AS LONG AS THERE WERE ALL-AMERICAS

THERE WERE *Inland* AWARDS

As long as the All-America Package Competition was run, Inland Container Corporation was a constant award winner.

We mention this nostalgic thought to emphasize our leadership in the days when competition was the selective factor. Those days will return and with them will come a host of new packaging problems and a number of new materials to solve them.

Our war-time experience in making packages has served to enrich our knowledge and skill the better to meet your post-war problems.

●

Inland BOXES BUILD GOOD WILL

INLAND CONTAINER CORPORATION

SALES OFFICES: INDIANAPOLIS, INDIANA • MILWAUKEE, WISCONSIN • MIDDLETOWN, OHIO • EVANSVILLE, INDIANA • CHICAGO, ILLINOIS • DAYTON, OHIO • CANTON, OHIO • LIMA, OHIO • CINCINNATI, OHIO



EVERY SHIPMENT - *Safe - Secure*

Counterboy AUTOMATIC MOISTENING and WATER SUPPLY CONTROL gives you maximum sticking results from your gummed tape.

VALUABLE LADING, these shipments of yours. Valuable to your customers because of the need they are destined to fill—valuable to you because of the investment of capital, production effort and raw material that made the shipment possible.

When the product you manufacture fails to arrive in its factory-produced condition, *thru the failure of improperly moistened sealing tape,* it cheats your customer of vitally needed material, robs you of an investment and breeds broken confidences.

Counterboy Sealing-tape machines with patented Automatic Moistening and Water Supply control give you the absolute maximum sticking result of *your* gummed tape. Another way of saying—maximum contents security from the largest to the smallest shipment.

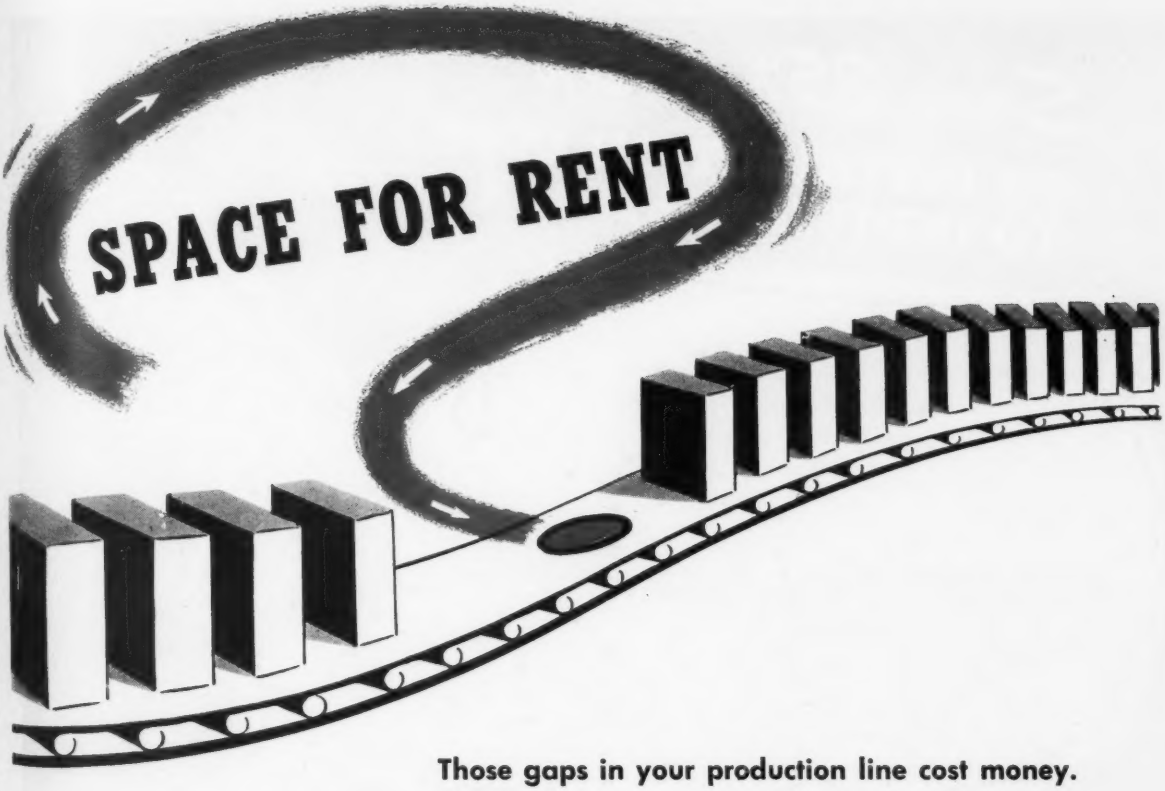
BETTER PAC CLOTH TAPE MODEL FOR SEALING WATERPROOF TAPE

One of Counterboy's important shipping room models. Equipped with a specially hardened steel shear, the Cloth Tape Better Pac is an absolute necessity for water-proof tape.



Counterboy
SEALING-TAPE MACHINES

BETTER PACKAGES, INC. SHELTON, CONN.



Those gaps in your production line cost money. They should be filled with paying occupants.

Your cartons are not merely so much converted paperboard at so much per thousand. Accurate, uniform cartons hold the answer to the smooth, uninterrupted operation of your filling equipment.

Consider your *total* packaging cost — from receiving platform to finished goods inventory.

We offer you our many years of experience in the manufacture of precision packages.

THE OHIO BOXBOARD CO.

RITTMAN, OHIO

Manufacturers of Paperboard, Folding Cartons, Corrugated and Fibre Shipping Containers

SALES OFFICES: RITTMAN · CLEVELAND · PITTSBURGH · NEW YORK · CHICAGO

Save 25%-35%

OF DISTRIBUTION COST TO INDIVIDUAL ADDRESSEES



Coast to Coast!

★ BOOKS
★ CATALOGS
★ DISPLAY MATERIAL
★ ALMANACS
★ DIRECTORIES
★ SAMPLES

OUR special distribution system is used by the largest publishers and national advertisers to save 25% to 35% as against parcel post rates *with no loss of time.*

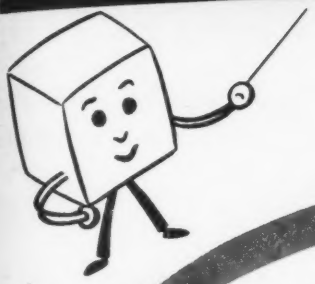
154 Distributing Centers in U. S. A.
Detailed Information Upon Request.

Whaling DISTRIBUTING CORP.

ECONOMICAL NATIONAL DISTRIBUTION

75 VARICK STREET • NEW YORK CITY

PACKAGING HAS NEW PROBLEMS



IT'S no longer difficult to sell goods. Today the problems are production and conservation.

Our peacetime experience stands us in good stead as we supply the armed forces and essential industries with the corrugated shipping containers they need to protect precious goods.

Our wartime experience will stand *you* in good stead when you want the displays to help you ship and sell goods economically—when there are goods to sell, after the war.

This display stand is an example of the kind of product we offered to all. Today, our facilities for making these stands are limited. Tomorrow — with victory — you will be able to get them once more.



THE OTTAWA RIVER PAPER CO.
THE MARK OF MERIT ORPCO TOLEDO, OHIO

THE OTTAWA RIVER PAPER CO.

TOLEDO, OHIO

Corrugated Shipping Cases, Sheets & Liners, Special Corrugate Fillers & Die Cut Parts

XUM



FINE PACKAGES NEED EXTRA SHIPPING PROTECTION

"On-to-Sta" gummed tapes not only seal shipments much more quickly—but they seal them securely, giving the additional protection that fine packages need.

In our complete line of gummed tapes is one to suit your purpose:

- GUMMED SEALING TAPE, PLAIN & PRINTED ★
- "CARPAC" REINFORCED SEALING TAPE ★
- HEAVY GUMMED KRAFT ★
- GUMMED CAMBRICS ★
- "INERWOV SOLSEAL" REINFORCED WATERPROOF TAPE ★
- ASPHALT LAMINATED REINFORCED WATERPROOF WRAPPING PAPER ★
- CREASED GUMMED STAY ★
- GUMMED HOLLANDS ★
- COMBINING ★

If you tell us your problem, we will send you samples of the proper sealing tape.

ATLANTIC GUMMED PAPER CORP.

MANUFACTURERS OF *"On-to-Sta"* GUMMED PAPERS

PLANT & MAIN OFFICE: ONE MAIN ST., BROOKLYN 1, N. Y.

BRANCH OFFICES: PHILADELPHIA · PITTSBURGH · CHICAGO · BOSTON · BUFFALO · ATLANTA · LOS ANGELES · HAVANA

XUM



MERCHANDISING

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Making Effective Use of Windows 672

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Package and Product Display in the Store 697



1

1. A display can do a great deal more than introduce a new product and produce sales in a competitive market. A good display can also incorporate an emotional appeal that will build permanent good will. PhotoWindow Advertising Inc.

Display as a merchandising force

As long as goods are sold in retail stores, there will be a need for store display materials to help sell them. The principle holds even now, when shelves are empty and the consuming public avidly seeks unobtainable goods.

The term "store display material" is an inclusive one, which takes in:

1. Window material—displays, backgrounds, door transparencies and decalcomanias, posters, cards
2. Counter pieces—easel cards, small displays and dispensers
3. Floor materials—large cutouts, "island" displays and merchandisers
4. Wall materials—shelf hangers, festoons and fountain trims.

All of these media are direct leads to actual sales at the retail store, where the potential consumer comes into contact with the actual product, in the buying mood, armed with the means to purchase. Other forms of advertising create a desire—or at least that is their intention; but that desire is aroused at a point remote from the opportunity to buy. The power of display material lies in the fact that it makes use of color, size and construction to re-arouse that desire and remind consumers of their needs right where the merchandise is to be found.

It must be remembered, however, that the retail store is merely a channel for a number of items ranging from 200 to 28,000 in number. Neither proprietor nor clerks can be expected to tell the individual story of all these products. The experienced merchandiser will not rely on them to give his products individual attention. He will speak for himself at the sales outlet with appropriate display material.

As a rule, alert dealers welcome such sales helps. With few exceptions, retailers are proud of their stores. They are particular about matters of appearance, quality of merchandise, and they are eager to sell their goods. Speaking generally, they are much closer to the consumer than is the manufacturer, and, while they may not be as articulate as members of the advertising fraternity, they have pretty positive ideas—based on experience—about the pulling power of different kinds of displays. They rightly place a high value on using their windows to get customers into the store. They need "dealer helps" and will gladly use the kinds which are intelligently prepared with the dealers' needs in mind.

Unfortunately, too often this type of advertising is added to an otherwise well-prepared program only as a

last minute thought—one which tags along after national advertising is all scheduled and package designs completed. "Store display," says a nationally known merchandiser, is the important last link in the distribution chain between producer and consumer."

Because it is used at the store, display as a medium has certain advantages. One of these is selectivity. Magazine circulation has the tremendous power of over-all coverage of a class market, reaching its prospects wherever they may be located. Store displays can be spotted in selected spots where these prospects may be found in greatest number, and window display "circulation" can be utilized to cover a specified zone selected with reference to the distribution of a product; or, if the advertiser chooses, window display can be used as a major medium to blanket the entire nation.*

Another point in favor of store display material is its wide flexibility in size, form, structure and coloring. It makes possible a three-dimensional presentation, and it also permits showing of the actual product, packaged or unpackaged.

The power of display material is also manifested in its ability to do "team-work" with other forms of advertising. Merchandisers have tested this power. In one zone or region of distribution, the general advertising program will be supported by the use of store material; another region—where presumably the space advertising program is equally potent—will have no such "point-of-sale" support. Then, comparison of sales results usually demonstrates the potency of store display in selling its wares.

In many instances, too, where the manufacturer's distribution does not warrant a national campaign, the use of store display alone, without the influence of other advertising, has proved effective in building up consumer sales. Perhaps the reader can recall instances where he himself has made the purchase of an article he had never heard of, simply through seeing it vividly and colorfully presented by means of a store display at the point where the purchase could be made.

Mention must be made again of the need for providing displays with the dealers' needs in mind. This involves a merchandising approach to the problem of preparation. "Ideas" for displays probably do not come from inspirations or sudden flashes of genius, but from a clearly thought out analysis of the marketing aspects of the particular product. This of course must begin with a full knowledge of the product itself and its features. Next there must be an acquaintance with the complete advertising and promotion program. Above all, it is imperative to be completely familiar with the full distribution set-up.

If a display program is to produce the results which may very properly be expected of it, plenty of time should be allowed for its preparation. This is particularly true at the present time, when every activity suffers manpower shortages and priority war work takes precedence over civilian merchandising programs, to say nothing of the necessary restrictions of materials. In ordinary times, four to six weeks from the time of approval of a finished sketch to the delivery of the display material is usually ample, even for difficult and complicated constructions. The display user can facilitate delivery by pushing through the preliminaries which must precede the approval of sketches. Many display users, who are not familiar with production processes of the materials they use, become impatient and wish delivery very shortly after they O.K. the art work. These processes can't be hurried if good work is to be done; the reasonable customer will give the lithographer plenty of time.

There is waste circulation in every advertising medium. Store display is no exception. Its wastes occur mainly through failure of dealers to use the material, which in turn may be due to its inappropriateness to product or outlets, or to the method chosen for its distribution. Properly conceived and intelligently distributed, however, store display material is a very powerful merchandising force.

* See "Measuring Display Circulation" p. 674.

2



2. The true value of display as a medium is now attested by the fact that window advertising carries on in spite of shortages of goods, of display materials, and of manpower. Kolynos has met the latter shortage by replacing missing installation men with women who are doing a good job.



1

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XUM

What jobs can displays do?

by Edward T. Sajous

Display can do a great many jobs, but asking one piece or one series of pieces to do too many jobs all at the same time simply results in failure to make any one point or get across any one well-clinched message.

The piece frequently emphasizes equally a number of major elements including, perhaps, sale of a premium, suggestion of related items, emphasis on a prestige note and putting over a strong bargain price message. As a result, no single job is clearly and decisively accomplished and the material simply helps add to the unfavorable testimony against display to the disadvantage of all concerned—advertiser, retailer and display manufacturer.

In other words, the problem should be handled with an attitude of "from the inside out" rather than from an "outside in" approach. That is to say, creation should be based upon visualization of a definite objective, using thorough analysis and recognition of all the factors in the problem. Then precise planning and careful arrangement for use of elements specifically designed will attain the definite objective or hit the particular target set up.

What, then, is effective procedure in successful display, creation by the "inside-out" method?

As one point-of-purchase advertising authority put it some years ago, "A valid sales idea is the starting point for display planning." The following list of nine specific objectives, with selling points of display emphasis classified under each for reference, is offered as a guide in production of accurately aimed point-of-purchase advertising, precisely planned to fulfill exactly gauged needs:

1. *To gain attention:*

Use of dimensional effects.
Emphasis on sheer beauty and quality atmosphere, frequently with color.
Use of highly unusual, bizarre, spectacular effects—color, motion, lighting.
Life-size figures, human interest.
Bold poster treatment.
Exaggerated size packages or products.
Huge, mass effects by use of reproductions or actual packages or products.
Smart, humorous, "gag-line" type copy in conversation balloons.
Cartoons.
Reproducing packages or products in human figure forms.
Use of well-known, popular trade character.
Animal figures—cartoon-type, if appropriate.
Emphasis on trade mark, slogan, testimonial line or letter.

2. *To use atmosphere as principal feature:*

Institutional story presentation.
History of company, product.
Celebration of an anniversary.
Presentation of story with scientific emphasis and color.
Building scientific background for product.
Use of humor.
Building quality atmosphere, appeal.
Developing holiday, seasonal appeal, background.
Style atmosphere.
Building gift theme.
Appetite appeal.
Sports background.



1

1. This unit takes on the job of building consumer confidence in a complete line of products made by one manufacturer. Photo by Kindred, McLean & Co. 2. (Opposite page) The atmosphere of war-time work is used in this Kellogg's All-Bran display to attract attention. Photo Zipprodt, Inc. 3. This display is constructed to exhibit an actual premium which is offered as a bargain with any of Devoe & Raynolds paints. Photo Einson-Freeman, Co., Inc.

Economy, price, bargain appeal.
Specific group appeals—housewives, munitions workers, debutantes, secretaries, etc.
Illustrating product in home atmosphere.
Human interest.

3. *To coördinate with advertising and merchandising:*

Tie-in with main advertising theme.
Coördination with magazine, newspaper, radio advertising.
Continuity of package color scheme in display.
Consumer contest tie-ins.
Premium offers.
Use of newspaper comic-strip advertising characters in display.
Use of screen, stage, radio, sports stars.
Tie-in with news events—local slants on national new happenings.
Coördination with special sales program—deals, etc.

4. *To help the consumer:*

Easier shopping with product dispensers—floor, wall, counter, table, etc.
Methods helping in correct selections.
Dispensing advertising material—educational.
Dispensing coupons, offers, contest announcements.
Dispensing samples.
Convenience in handling merchandise by permitting customer contact with products, materials.
Self-demonstration—offering customer something to do in action related to product.
Offering customer something to do with action unrelated to product.
Recipes, reminders, directions.

5. *To feature use of the product:*

Emphasize cost of product manufacture, operation, etc.
Bring out uses.
Illustrate how to use, possible varieties.
Suggest uses with other items.
Feature new uses.
"Before and after," dramatizations—benefits gained through use.

6. *To help the dealer:*

Coöperative sales activities—groups of manufacturers joining in sales plan.
Creating the departments to merchandise related items.
Promotion of the related item idea.
Helping improve appearance of retail outlets.
Supplying suitable, atmospheric backgrounds for seasons, occasions and products.
Improving dealers' services to customers.
Featuring prices of merchandise or services.

7. *To feature the product itself:*

Presenting new container frequently with old.
Display full line of products, actual or in reproduction.
Illustrate the product or package.
Feature actual product or package in display.

8. *To feature manufacturing aspects:*

Depict how product is made, processes, etc.
What product is made of, raw materials, etc.
Where product is made, factory, plant, shop, etc.

9. *To feature special sales points:*

Increasing sales unit.
Selling the product with related items.
Emphasis on full-line selling.
Selling necessary accessories with the product itself.
Suggest sale by illustrating actual sale in process.
Demonstration of the product, supplementing work of demonstrators with display.
Featuring sales arguments in lists, summaries, etc.
Highlighting one sales point, dramatization, etc.

2



3



Making effective use of windows

by R. W. Ingram

Regardless of current shortages and restrictions, the basic principles which underlie the effective use of store windows still hold true. Perhaps more than ever—because of the pre-occupations of war—displays must put extra stress on the tested devices for compelling attention.

Very often it is quite apparent that the simple fundamentals of window display are overlooked perhaps inadvertently in an endeavor to achieve esthetic effects rather than to create buying impulses which culminate in the selling of merchandise.

In the drug field, particularly during the past several years, we have been experiencing a complete transition in the conception of displaying merchandise. There was a time when the retailer thought of his windows as a place in which to hang pictures and then glorify those pictures with elaborate crepe paper backgrounds which oftentimes detracted from the display sales appeal. But the writer believes that this era is gone forever and the window must serve a more practical function in showing a variety of the merchandise on sale in the store and affording suggestions for window shoppers.

An empty window never sold any merchandise—in fact does not even give a clue to the type of merchandise the store carries. However, window space is important and its use must be considered in conjunction with the rental value of present-day drugstore locations. According to the government, the familiar phrase, "down at the corner drugstore," will justify it because a survey shows that 84 per cent of the country's drugstores are located on street corners where rentals are naturally higher than in the middle of the block. The landlord knows that the windows are valuable. In fact, it is obvious that the front of a store is worth more per square foot than the back. Consequently, the windows of a store are perhaps responsible for from a third to a half of a store's rent and they should be made to pay their rent through multiple display of a variety of items as against a limited display of a single item whose sales volume perhaps might not offset one-twentieth of the store's rent. Therefore, the window is the real entrance to the store. To be sure, the feet go in through the door, but the eyes of the customer go in through the window.

In expressing these views, we are naturally approaching the problem of window display from the dealer's standpoint and not from the manufacturer's standpoint. It is a dealer medium pure and simple and the manufacturer who puts the dealer first in the preparation of display material is the one who stands to profit through having the material used and thereby publicizing his products advantageously in conjunction with competitive and non-competitive products at the point-of-sale. The window belongs to the dealer and not to the manufacturer. This space is obtainable at the discretion of the dealer and is not a purchasable medium of advertising in standards of time and/or space such as publication, radio, car card and poster advertising.

In the process of creating window display ideas, a valuable lesson can be learned from walking through the pushcart districts of any large city or from observing the way merchandise is displayed at the vegetable market. The fellow who features only one product, perhaps potatoes or lemons, commits himself to only a limited market because everybody passing this display may not be in the market for potatoes or lemons at the particular time.

Conversely, the pushcart peddler, desirous of appealing to the masses, displays potatoes, carrots, cabbage, beets, spinach in conjunction with apples, oranges, bananas, etc. The point is, his objective is to appeal to the masses to the degree that everybody might desire some one or two items he has on display and in drawing their patronage he exposes them to the sale of one or more related items. Confucius say, "Bird choose tree. Tree not choose bird." We paraphrase, "Customer choose store. Store not choose customer." Yes, customers choose stores where a variety of merchandise is on display.

The government further reveals that 65 per cent of all drugstores were found to be equipped with open display tables for interior mass display of merchandise. *Such displays were coincident with large volume of business!* With this overwhelming evidence favoring mass merchandise display to appeal to the varied preferences of the masses, it would certainly be poor business to buck the trend.

However, a big problem confronts all manufacturers who distribute their products through drugstores in obtaining good display push on their respective products. The trend in mass display is growing so fast that druggists, to offset limited depth of window, are building steps in the window for height to gain more space in which to display merchandise. This naturally means smaller pictorial displays with powerful eye appeal and a dramatic selling idea to counteract the static arrangement of merchandise on display.

Large display pieces are today practically obsolete because abnormal size utilizes space which can be better devoted to display of more merchandise. An example of how we are riding with the trend is a display developed a year or so ago—Dental Health and Beauty Needs Display, the title of which implies that more than one product is on sale. Most dentifrice advertising is based on a beauty appeal and so what more natural tie-up than a display of beauty aids in conjunction with dental needs.

We go a step further, through pictorial suggestion, in reminding passers-by that they might also need cameras and film as depicted in the display centerpiece and side cards. We show how the retailer can utilize this display

1



1. Assisting druggists to build up a much neglected market, Bristol-Myers took all of the related items in men's toiletries and designed a unit with a real sales appeal. 2. A similar principle for women's items was put into action by developing an After-the-Bath unit, giving Mum the spotlight, but displaying what amounts to a complete department for lotions, manicure aids, hair brushes, face creams and other such cosmetics for the feminine buyer.

material in a step window or in other words, the mass merchandise type of window.

To the same degree that two horses would pull a heavier load than one horse, tests have proved that a counter display of the same merchandise will make a window display more effective and so we furnish a counter tie-up display, with all window material.

Another illustration is an entirely different type of merchandising promotion—a departmental display idea not based on one product, but suggestive of related items for use by men—Men's Needs Departmental Display. We discovered that drugstores were neglecting a big market in the sale of men's toiletries because the drugstores were catering primarily to cosmetic departments, baby departments, prescription departments, feminine hygiene departments and tobacco departments. In some measure the lack of drugstore appeal to men has forced them to purchase their toiletries at tobacco stores, at the railroad station newstand, in men's shops, and, in many cases, to request their wives to buy shaving cream or razor blades at the grocery store.

Our Men's Needs Display was designed to help the retail druggist recover this masculine business and build up a department catering to the needs of men who buy hair preparations, razors, blades, shaving cream, combs, brushes, talcum, lotions, etc.

Another winner is that illustrated for Mum—not just a Mum Display, but a selling idea—After-the-Bath Display: a departmental idea for the druggist to feature deodorants, depilatories, lotions, manicure aids, hair brushes, combs, face creams, powders, rouge, perfumes, etc.

Equally important as the display itself is the method of promoting use by the retailer. We have a splendid promotion device in the Bristol-Myers *Merchandiser* magazine

2



published to give the druggist sales-building ideas exemplified in the display.

Note to ponder—Thousands of drug stores have been modernized inside and out. Old-fashioned glass show cases have been discarded and followed the passing of the familiar glass show globes which are now museum pieces. Glass doors have been removed from wall shelves. Floor step fixtures have been installed: all for greater open display inviting customers voluntarily to select, handle and buy. Step fixtures are being installed in the windows for showing a larger variety of merchandise. Now then, to pose a question—under the circumstances and with a probable increase in new products after the war will there be as great a need for lithographed display material other than dummy cartons, window price posters and price cards in the future as there was heretofore? If so, where will the dealer find space to use this material?

XUM

Measuring display circulation

by Frederick L. Wertz

SOME years ago we developed a quite simple definition of circulation as applied to advertising—"The number of opportunities to deliver a sales impression."

In newspapers and magazines, circulation represents the number of copies of each publication containing an advertisement that is acquired by the public, regardless of how many individuals turn the page and see the particular advertisement.

In outdoor posters and car cards, circulation represents the number of people who actually have an opportunity to see the poster or car card, without regard to the actual number who may look at a particular advertisement.

In window display, circulation is the number of people passing a display on the near-side sidewalk, with the opportunity to see the display. As in other media, whether or not they look at it does not enter into the circulation count.

In measuring circulation, several qualifications have been formulated, such as returned newsstand copies, exchanges and sample circulation in the publication field, and in the poster field, distance and visibility.

Research applied

When The Advertising Research Foundation established the yardstick for the measurement of window display circulation, they made the qualifications extremely severe, and limited the circulation to the number of people passing on the near-side sidewalk only, not counting automobile, street car, bus or far-side sidewalk circulation at all.

Due to varying sidewalk traffic conditions in different parts of a city, the exact measurement of window display circulation presented many difficulties. The detail involved makes it impractical to apply circulation figures to each individual location. The Advertising Research Foundation decided that the question of coverage of a market could not be separated from the circulation. In their report entitled "Window Display Circulation and Market Coverage—How to Select, How to Verify" is a complete explanation of the method by which circulation and coverage should be determined.

Checking the method

This method was checked, tested and verified in nineteen laboratory cities. Formulas developed from these tests have been re-checked in a considerable number of cities by our organization, within the last two years, and these formulas have been found ultra-conservative in every instance.

The Foundation's research disclosed that there was a definite minimum display quota required for coverage, varying for cities of varying sizes, and that comparative circulation was obtained by the use of minimum, normal, first and second intensity coverage.

By dividing each city into business districts, a definite pattern for the distribution of displays was set up and, based upon this pattern, circulation figures for the varying intensities of display coverage were determined.

For example, in Waterbury, Conn., with a population of 99,900, the minimum showing of displays would be 13.

1. This store window provides the medium for conveying a sales message, but the timeliness of that message and the character of the material, as well as the way in which it is installed, make it register with the "sidewalk circulation."

1



2



2. The hurrying passer-by will stop to look at a display which features a prosaic product like ink—provided that display is interesting and colorful. Here is one which arouses the buying urge while it delivers a worth-while message.

Normal coverage would be 26, first intensity 39 and second intensity 52. Actual counts showed that the minimum quota of displays developed a daily near-side sidewalk circulation equivalent to 25 per cent of the population of the city. Normal coverage, 26 displays, developed a daily circulation equal to 50 per cent, while the circulation for first intensity coverage, 39 displays, was 75 per cent. Second intensity coverage, 52 displays, showed a daily circulation equivalent to 100 per cent of the population.

Number of displays required

On the basis of a display remaining in a window only one week (although it is well known that most displays will average ten days to two weeks in a location) we would have a circulation for 13 displays properly distributed in Waterbury, Conn., of 172,000. Normal coverage would give a circulation of 344,000, first intensity coverage 516,000 and second intensity coverage 688,000.

Of course quotas vary for each city, and the circulation per display would be higher in larger cities and less in smaller cities. However, applying these formulas to a complete coverage of the United States, as represented by all cities with populations of 10,000 or more, and assuming that displays were properly distributed, we arrive at the following figures:

Total Population	58,323,271
Minimum Coverage	8,952 displays
	103,943,200 weekly circulation
Normal Coverage	18,904 displays
	207,866,400 weekly circulation
First Intensity Coverage	26,856 displays
	311,829,600 weekly circulation
Second Intensity Coverage	35,808 displays
	415,772,800 weekly circulation

While the resident population of the cities of over 10,000 is 58,323,271, the estimated trading population of these cities is somewhat more than 90,000,000. Therefore a window display campaign which included all of these cities would cover fully 75 per cent of the entire population of the United States and its impact must be a major one.

The yardstick

The weekly circulation figures shown above are based on near-side sidewalk circulation only. Vehicular traffic, far-side sidewalk circulation and the fact that displays may remain up an average of ten days or two weeks are additional values.

These circulation figures are based on actual eighteen-hour daily counts in laboratory cities made by the National Window Display Research.

It will be seen, therefore, that there is a definite yardstick for the measurement of window display circulation, and this yardstick has the approval and authority of The Advertising Research Foundation of the Association of National Advertisers, Inc., and the American Association of Advertising Agencies.

Every check that I have known to have been made since this yardstick was established has proved this measurement to be ultra-conservative.

It cannot be stated too often that window display is a reminder at the point-of-sale, where the opportunity is present for immediate action, so that properly planned displays compel the "circulation" to remember the product's advertising message. Window display is the best antidote to the "forgettin' man," whose lack of memory is probably the greatest single cause of loss in the effectiveness of advertising, for it is a constant reminder, greeting him at every turn.

Preparing displays

by Michael Gross*

THE reason lithographed displays are looked upon as the "Orphan Annie" among the various mediums of publicity is just because the advertising man persists in passing the buck to the display salesman; who passes it on to his art department manager; who, in turn, passes it along to the first artist on his staff who has a leisure moment. That sequence always has made, and always will, for mediocrity—the greatest scourge from which window and store displays suffer. It just cannot be done that way—successfully. A certain amount of groundwork must first be cleared away and certain foundation stones properly laid. Disheartening though it may sound, it is up to you, Mr. Advertising Man, to see to it that this essential portion of the task is accomplished efficiently and effectively. And of all the ways to go about the job, wielding the pick and shovel yourself tops the list.

See a dozen or more of your representative dealers; merchants who have shown that they are alert for any plan to increase business. Talk to them frankly. Tell them you want to get up window and store material which will meet with their approval; which will reflect their viewpoint as to what a display to feature your product should be like.

But bear one thing in mind. Merely outlining your plan and then asking these men what they think of it will invariably result in a verbal barrage of: "Great stuff!" and "Sounds fine to me!" which leads exactly nowhere. It may flatter your vanity to ask what lawyers call leading questions and thus be sure of receiving only affirmative answers—but these leading questions too often result in altogether misleading information. The dealer is only human and would always rather agree with you than cross you. Not only is it much easier but it certainly involves far less mental effort to approve a plan than to think up objections to it. A good way to get definite information without tipping off what you, yourself, have in mind, is to ask the dealer to show you the displays your competitors are distributing and then urge him to tell you what he finds wrong with them. You may discover, early in your investigations, that a product such as yours does not turn over fast enough, nor does it yield a healthy enough mark-up, to warrant the dealer giving anything but counter space to a display featuring it; or that the material he receives from your competitors is altogether too large for the importance of the item; or, worst fault of all, that these displays feature the wrong selling point. Perhaps you'll find, to your utter astonishment, that what the housewife demands in your type of product is utility, whereas most of the displays the dealer has been getting featured a beauty appeal. Or probably just the reverse may be true.

You'll come back from even a two-day trip of this kind with more factually founded information about what the dealer wants in the way of display material than you could have gotten from a month of burning the midnight oil trying to figure it out for yourself. You'll have a new, and an accurate, conception of what size your new display should be; how it should be constructed; and what selling points it should feature to make the storekeeper like it well enough to put it in his window or on his counter. And he's either got to like it that much or he may just as well not like it at all. You can't win half a battle with a dealer.

Window and store displays must be aimed to the dealer—not through him. If he doesn't think the material you send him will help sell more goods, he'll junk it—nor will all your excited talk about the low order of dealer intelligence serve to cancel half a line of that inexorable fact. After all, it is the dealer's window and you are merely a guest, coming in only if you are given an invitation. One sure way of being invited is to stop thinking about your problems and your sales and begin to pay a little attention to the dealer's problems and his sales. Always keep uppermost in your mind the fact that you need the dealer far more than he needs you, despite all you may have heard about building up such an overwhelming call for your product that you will force the dealer to carry it, whether he wants to or not. (Of course, this generalization falls down during a wartime sellers' market.—*Ed.*)

The more time you spend finding out, from your dealers themselves, what they really want, and the less time you spend guessing what they want (or getting some display salesman to do the guessing for you), the more successful will your finished displays be and the more of your product will they sell.

But, important as it is to get this dealer viewpoint, the groundwork has not been fully laid when you have heard all he has to say. It is now necessary to do a little digging among your own salesmen. Either in person at a sales conference, or by individual letters while they are on the road, every man on your sales force should be told that a window display is being planned and that any helpful suggestion he can give you will not only be appreciated but immediately acted upon.

While it may be true that the average "knight of the grip" understands very little about the mechanism of consumer-response or the psychology of perception, you must admit that he does get around. He talks with dealers every day, intimately and frankly. He can tell you if the storekeepers in his territory will give window space to a display featuring the line or whether they will use only counter cards. He has discovered, by asking the direct question, exactly where he will be allowed to put up a window streamer; arrange a floor pyramid; or tack a show card on a bare expanse of wall. And he won't be

* Reprinted in condensed form by permission of The Ronald Press Co. from "Dealer Display Advertising" by Michael Gross.

guessing when he tells you about it. He actually does know.

An advertising man will invariably come closer to producing a 100 per cent perfect piece of store advertising by listening to the advice of his dealers and salesmen than he will from the layouts he makes sitting in his office, or that the lithographer's representative brings around to him. Merely summarizing such information as he receives will, at least, give him a cue as to whether he wants a window cut-out or just a counter card; what the approximate size should be; whether the actual package should be featured or left off; and if the selling price is to be played up, subordinated, or eliminated altogether. The wrong guess on just a single one of these factors has doomed to failure many an edition of otherwise perfect displays. Don't make the mistake of thinking that the more designs you allow lithographers to submit, the greater will be the selection and the more apt will you be to find a perfect display idea.

Aside from the economic loss to the various lithographers (I have seen $1,200 worth of sketches submitted on an order that couldn't possibly amount to over $750) there was invariably an aftermath of squabbles and petty bickerings. As the same story had been told to each lithographer's salesman, and as not one of these men had anything in the way of an original thought to add to that story, it was only natural that the submitted sketches would bear some resemblance to each other. And, because these designs did look alike, a flood of charges would immediately break forth when the winning display was placed on view. "That fellow lifted my idea bodily," one of the losers would cry; "You stole the construction from the sketch I submitted," would wail another; "That way of holding the package was originated by us," would yell a third—and the advertising man would begin to toy with the idea of taking a header off the nearest pier.

In point of fact, this condition became so bad that it forced buyers of display materials to turn to their advertising agencies, have them prepare display sketches, and then ask a few of the leading lithographers to figure on reproducing them. But this didn't work out so well, and doesn't to this very day, for a very good reason. Advertising agency training is in one direction only: the preparing of material to appear in newspapers and magazines. All of this copy is planned for what is known as a "short throw"—meaning that it must be definitely designed to be read about six inches from the eye. But a window display, to be successful, must be conceived for a "long throw"—it has to get over its selling message six feet from the eye—and the technique of preparing such material differs radically from periodical advertising. Another difficulty an agency man is up against is that all his experience is in mediums possessing only two dimensions: length and breadth, whereas a show window has a third one, depth.

Well, here is how the modern advertising man finds a solution. First, he makes his own selection from among the lithographers who call on him. Secondly, he makes a habit of scanning the imprints on the really outstanding displays he sees about town. And, thirdly, he consults the display sections of the advertising magazines. Having discovered who the display specialists are, he gets in touch with not more than four of them, puts his problem before their representatives and asks for a few visuals from each. All he wants, please note, are rough sketch ideas—and that is all that is necessary.



Careful planning produces displays that will attract the housewife. Photo Forbes Lithograph Manufacturing Co.

There is no finer spur to a creative artist than letting him know he is pitting his ability against that of some rival display expert. There is also no better whetstone for an estimater's pencil than the knowledge that a couple of other lithographers are figuring on the same set of specifications.

And now you are finally ready to talk to the representatives of the lithographers who are going to work with you. Give them such basic information as to whether you want a window display, counter card, hanger or floor display; what type of store handles your product; whether or not you sell through jobbers; and what your plans are for distribution. There remain such secondary important questions as: "Are you going to ship the display with the merchandise?" If so, the salesman will want to know the size of your shipping container, so that he doesn't bring around a sketch which will have to be folded sixteen times to fit into it. Is the display to be shipped by itself? Then the size must be kept within parcel post limits, or you'll find yourself faced with a tremendous express bill.

Telling the salesman the few essential things he must know if he is to do a sensible job doesn't constitute, by any stretch of the imagination, furnishing him with an idea. You are merely fencing him in, so to speak, to keep him from wandering all over the lot. If you have consulted your dealers and salesmen, you are in the happy position of not having to ask the display salesman to guess. You tell him, instead.

Another thing the salesman will want to know is what quantity you were thinking of buying. Actually, the size of the order is furthest from the mind of the salesman when he asks that question. Although it rarely occurs to the man on the buying side of the desk, quantity does make a difference in the type of sketch to be submitted. If you want only a thousand cut-outs, the salesman knows he must caution the art manager to stay away from elaborate constructions, complicated die-cutting and designs that will take many colors to reproduce. The quantity is far too small to absorb the heavy initial cost of elaborate engravings and dies. On the other hand, if you have in mind to buy 10,000 three-piece, 28 in. by 44 in. screens, the art department can let itself go the limit, for now the run is large enough to absorb the cost of preparing the job.

Now comes the salesman's parting thrust—and it has started more arguments than anything else in his repertoire of interrogations. The fireworks usually start—although there is no real reason why they should—when he asks: "What do you expect to spend per display?"

There is one reason, and one reason only, that prompts the salesman to ask that question. He wants to know what artist to use and what type of display to submit that will come within the price limit you set. A certain artist, who specializes in just the very subject you want to feature on your display, may charge as much for one of his roughs as you have in mind to pay for the whole edition of finished cut-outs. How is the salesman to know that the assignment cannot be given to this particular artist unless you tell him what you have in mind to spend?

The best way to dispose of the price situation, fairly and tactfully, is in some such manner. Say to the man:

"In getting up your sketch, bear in mind that we can't possibly pay over a dollar each for ten thousand displays inserted in corrugated containers and sealed ready to ship. Of course, the more you can cut under this price and, at the same time, give us a real merchandising idea, the better will be your chance of getting the order. But, under no circumstances, will we go over a dollar a set."

Now let's see how far we've come. You've told the salesman the type of display for which you are in the market, based on your own knowledge of the definite dealer requirements; you've told him the quantity you want and what you have in mind to spend per display; you've told him how the material is to be shipped and when the job will have to be delivered if he gets the order.

With this information, plus a few other questions he may ask, any display man worthy of the name will be glad to go the limit to give you sales-producing ideas.

Wartime problems in production display

by Frederick L. Wertz

Special problems must now be taken into consideration in the preparation and production of all display material. Some of these problems are:

1. Shipping containers for displays—The War Production Board has issued specific orders that no new containers may be purchased for the shipment of advertising displays. This order includes new corrugated cartons and new wooden cases.
2. Paper and mount board—These must be conserved, and it is the obligation of all concerned to use no more than absolutely necessary.
3. Crepe paper—The shortage of crepe paper makes it necessary to determine the final use of all displays in advance, so that crepe paper, for the background trims of window displays (or substitutes therefor), can be secured.

Before planning and production are started, it should be definitely determined whether displays are to be professionally installed or sent out to dealers for their own use. In either case you must know how your supplier is prepared to make shipments. If second-hand shipping containers are available for either bulk or individual shipments, what are the sizes that can be secured? It may be necessary to plan the displays to fit the containers that are available.

Displays should be constructed of as light material as possible, and in most cases today it is possible to use no heavier than 40 pt. mount board, if proper construction and easel reinforcement are provided. It is even possible and practical to print displays on paper without mounting, with construction so designed that the paper is attached to a cardboard easel specially made for that purpose.

The shortage of crepe paper is a very serious condition. All crepe paper manufacturers are limited to a production of 65% of the paper they made in 1942, and while the pinch has not been felt very badly to date, this is going to become increasingly tight in the very near future.

However, there is no reason why advertisers should not use displays this year. In fact several advertisers are planning and using more displays than ever before, but it is absolutely necessary that more thought be given to the planning, execution and distribution of displays than in the past.

Displays are being constructed today in such a manner that the easel substitutes for an individual shipping container under certain conditions. The weight of displays is being kept down. Substitutes for crepe paper are being found. The ingenuity of your individual supplier will doubtless find a way to overcome all difficulties, but you must know in advance that they exist and require planning, or your display program will miss maximum effectiveness.

Relating displays to other media

by Carl Percy

The purpose of this article is to discuss window display in relation to other advertising. It is an interesting phase for the reason that it has many controversial aspects. It is well to remind ourselves that we are considering only the type of display material supplied by national advertisers for use in retail outlets.

Parenthetically, let it be said that this article is written without consideration of conditions imposed by a state of war. We have a war to win, we shall win it, and be on our way back to normal conditions. War conditions are by nature transitory; when those now famous bluebirds are flying over the white cliffs of Dover, we shall then wish to understand the problems of normal times.

Inasmuch as few advertisers follow exactly the same pattern in outlining their advertising policies, we must be aware of the fact that we must deal with typical cases.

There are advertisers who regard displays as a link in the selling chain and they quite naturally stress the importance of coördinating this link with the other such as radio, magazine and newspaper advertising. In theory, this is a perfectly logical position to take. However, as it works out in practice, our discussion may prove that there are times when this position is awkward.

When an advertiser buys windows as a sop to dealers, or as a specific for salesmen's complaints, there is less likelihood of a serious attempt at coördination. This attitude toward display usually finds expression under the more dignified characterization of "building dealer good will."

There is a very definite line of distinction between such "good will" types of displays and those which properly come under the general head of altruistic displays.

These displays sometimes assume the institutional character and build reputation for both dealer and advertiser. The direct sales type of altruistic display is a two-edged sword, doing its work of carving out results in two ways at the same time. On the one side it generally ties up with the national theme and thus may be con-

1 and 2. Two displays which reflect today's merchandise shortages and re-echo themes used in Bristol-Myers national advertising. Unmounted "roll-ups" which save paper, they serve to build dealer good will and to keep the brands alive.

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3. Dealers continue to clamor for these Mail Pouch displays—a series which has been in use for more than a decade. At least one store has on its walls every centerpiece produced during that period. The scenes are historically correct.

sidered as coördinated and, on the other hand, it helps the dealer to secure more profits than the straight one-product display permits.

The author has in mind two cases which point out the extremes in evaluation of displays. One, where the advertiser looks upon window display as his primary medium and supplements it with newspaper, radio and billboard advertising. This company does not have a complete national coverage, and the advertising must follow the channels of distribution. The other advertiser spends a great deal in magazines of general circulation, as an extensive radio program, and uses other media such as billboards, newspapers, etc., very sporadically. (Mail Pouch displays illustrated above are used as a primary medium.)

With window display, as with all advertising, the purpose is to sell merchandise to new customers and to keep old customers sold. It differs from other forms of advertising in that it must be shorter, bolder in treatment and easier to comprehend than, for instance, magazine advertising. It is not easy to lift illustrations and text from magazine advertising and make therefrom good window displays, so the coördination must confine itself to one or two of the main selling points.

As a rule, actual merchandise is shown with the window display and in this respect window advertising differs from all other forms. From observation covering many years in this field of advertising, the author would say that, by and large, the best displays give little outward evidence of definite coördination—that is to say, there is no pictorial similarity to the current magazine advertising and there is no attempt to follow the exact text of the advertisements. The notable exception to this is to be found in Chesterfield cigarette displays which often are based upon the themes and illustrations of their space advertising.

That we may see that definite pictorial and copy coordination is not always indicated, let us go far afield and review some concrete cases. With a typewriter display, the object here is to follow through with a prospect on the basis of an invitation to come into the store and actually try the product. Such a sales device would be out of order in a product like shaving cream for which demonstrations, naturally, could not be offered.

In many cases the display is not the combat unit, but rather functions as a mopping-up patrol. This clincher-action is illustrated in the G-E Mazda Lamp display.

Window displays often have been referred to as reminder advertising. The theory, presumably, is that national advertising does the selling job and the display is for the purpose of refreshing the prospect's mind. In this case it often happens that the only coördinating function which the display has to accomplish is to take some salient point from the national advertising and do a job of reiteration.

The pictorial device used to command attention is important, but to demand a dominant relationship between this and the pictorial content of the space advertising is

unwise for two reasons. One, frequently the magazine illustration is not powerful enough for display purposes and it credits the consumer with vastly greater retentive powers than he possesses and, two, that in such an attempt the coördination is apt to produce a display which is not as powerful as it should be. Displays that are not attractive when considered apart from all other advertising are not apt to be acceptable to the retailers, and advertisers who insist on this relation will often defeat their own purposes.

Retailers who use displays supplied to them are not rank amateurs in appraising the "come on" value of a display. Theirs is the power of life or death over the offerings made to them and they certainly will judge a display on its own merits and give little thought to coördination with other advertising. So it is that what seems so logical in theory does not work exactly that way in practice.

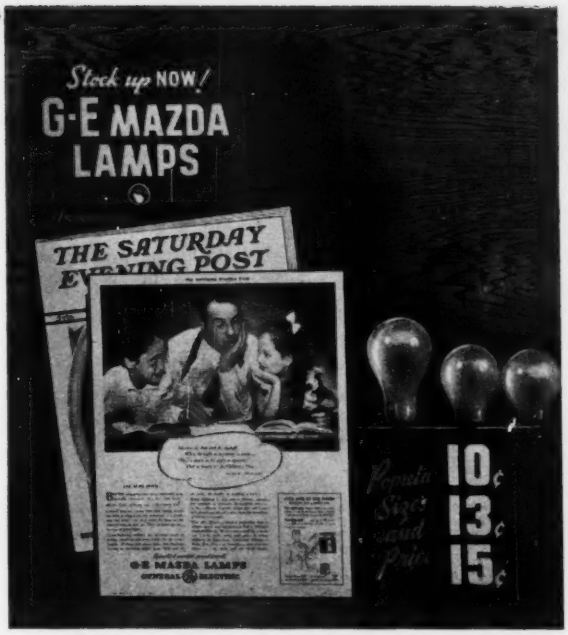
If we return again to the point that window display may properly be called reminder advertising, then the longer that reminder stays where it can be viewed by the public, the greater return to the advertiser. In the case of the Mail Pouch Tobacco Co., there were two very definite obstacles from a creative standpoint. First, it is a product that under normal conditions the dealer would not naturally select for prominent display. Second, the character of the product precluded the possibility of any lengthy disputations revolving around the appetite angle. Displays have long been regarded by this company as a primary medium, and the only coördination considered desirable was to register product name in an agreeable manner at point of purchase.

There was created for this company a series of displays of historical and topical interest. Each trim was designed to make the dealer's window attractive to the public, to give them reader interest and only incidentally to sell the product by the reminder value of the product name itself. These displays were painted in a high color key and reproduced in from eight to ten colors, thus enabling the company to get a longer, continued use of window space in the better stores.

Another good example of keeping the reminder before the buying public for a longer time by supplying the dealer with something attractive to his customers, and therefore acceptable to him, is to be found in the Eveready posters which may be characterized as purely human interest. When it comes to a question of coördination, it sometimes happens that the tail wags the dog. Eveready posters of the type illustrated had the same quality that so many of the better *Saturday Evening Post* covers have possessed. For this reason they were used by retailers for long periods of time and were found to be so effective that several of the better ones were used as full-page advertisements in color, in national magazines.

Many good altruistic displays have been created in the last 10 years; altruistic in the sense that they furnish a keynote for a window display which permits the use of related merchandise in the window. An excellent example of how this can be done without losing the thread of the national appeal, as used in all forms of advertising,

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4. A G-E Mazda Lamp display which reproduces actual advertising from a national medium, making a perfect tie-up.

is to be found in the Ipana "Camera" display. For years Ipana has been selling the "Smile of Beauty." This particular display is consistent in that it sticks to this theme and yet it gives the dealer an opportunity logically to display cameras, films and developing services.

Regardless of what advertising men may theorize upon, the dealer knows that the display appeals to an audience that is on its feet and moving. It must be fast. This does not preclude the possibility of using enough copy to accomplish a sales job. In the main, however, the fast-acting poster qualities must be retained.

Swinging over to one of the extremes of this subject of coordination, we find the display functioning both as a reminder and as a device to sell another form of advertising. The illustration showing how the Gillette Safety Razor Co. has attempted to get increased following for their radio programs served to indicate the possibilities in this direction. After all, the radio is basically an instrument of entertainment. It is a good will builder. A display which accomplishes the dual purpose of reminding people of the product, and getting more listeners for the program, might be said to coördinate in the leading role. Because, relatively, displays are not costly, there is no reason for considering them of less importance. Anyone having any illusions as to the keen retail merchandiser's appraisal of value should try to get some space in one of the chain drug stores, for instance. Never has the opportunity to reach the public been so zealously guarded as the chain store merchandising men guard the space in their windows. The window is a primary medium because it reaches more people for less money, at a better place, than any other advertising medium. Perhaps sometime other advertising will be coördinated with window advertising; who knows? Unpredictable things have happened—even in displays!

XUM

Display construction for postwar

by Richard E. Paige

For the duration of the war, lithographed displays will be limited by the many restrictions naturally befalling a civilian activity in a war-torn world. But for those far-sighted advertisers who are, even now, planning for their role in the postwar markets, lithographed displays must assume the important place in sales promotion that they had held prior to the wartime restrictions. With post-war sales plans under consideration, there is one question which inevitably arises: what will be the trend of to-morrow's displays? The answer is no mystery, and no prophet is required to foretell it.

In the field of woman's wear, there is a dependable means of forecasting what will set the style for the coming season—they watch what had finished the previous season as a best seller—and that is it! Over a period of many years, the popularity of the constructed display, as opposed to the flat card variety, has grown to great proportions among the most enterprising advertisers. Their wholehearted support has brought the science of display construction further in the past five years than it had advanced during the previous two decades.

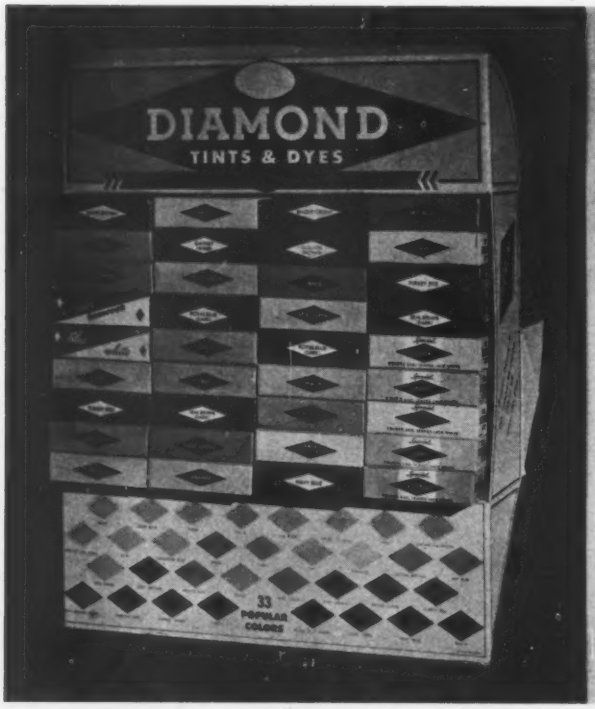
In the keen competition for postwar business, display construction will be a powerful factor. It will win the most valuable sales spots in the retailer's store for the advertisers who use it; it will take those sales-producing counters, windows and show cases at the expense of the flat cards—and the advertisers who use them. Even the point-of-sale "reminder" cards for soft drinks or liquors will find their colorful cards sacrificed to the reminders of other advertisers who frame their advertising, thereby giving it the appearance of a dressy fixture rather than a cardboard sign. The framed sign has a longer life, giving sales value out of proportion to the small extra cost which it entails.

The fact that postwar markets will be larger than ever before will be offset for many by the fact that more intense competition will fight for those markets. Dealers will have a wider choice of display material to select from, and a display will not only need to win the dollars of the buying public but—even more important—it will first have to win its place in the retailer's store against the most ingenious ideas the competitors will furnish. It is here that well-conceived promotions, good construction, ease of set-up, suitability to the dealer's needs and attractive lithography add up to a successful sales record. It is here that flat cards lose to the beauty and the richness of construction.

It is important to clarify just what display construction is and how it should be planned. Display construction has come a far way since the days of the early "cut-out man." Today it is an exact science, and the engineers who invent the devices have long since advanced beyond

1. A combination shipper and counter dispenser—the cover folds back to form an easel. Photo U. S. Printing & Lithograph Co. 2. An ice cream display with three-plane construction—it ships flat but can be set up easily. Photo Einson-Freeman Co.

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the point where dealers were asked to put elaborate displays together like a puzzle. The most complex structures can be made to fall into place almost automatically, and within the past few years there has even been a trend towards sending out set-up framed displays that "nest" like a stack of dishes and can be shipped in bulk with no special packing. Display construction is not a "plus" to be added to the sketch of an artist or visualizer like a pinch of salt to a recipe. It is the basic form of the display itself, and must be conceived as an integral part of both the merchandising plan and the artistic conception of the display's appearance. It is never an afterthought. A good display construction is a better investment of an advertising dollar than a flat card. The dealers always find a place for a good permanent-looking piece. But constructions need not be a luxury. Rich and novel effects can be obtained with 60 per cent ingenuity and 40 per cent cash.

Just look at the examples of successful displays illustrated here, and realize how simply each was accomplished. Each will contribute its share towards an understanding of how construction can enhance point-of-sale materials for an almost endless variety of products. Among these pieces are some that play the role of identifying the retailer as an agency for a product which some other forms of advertising have "sold" to the consumer. These are important links in the buying chain, despite the fact that no direct sales are attributable to them.

First, and perhaps simplest to understand, are the two Breyer's Ice Cream window displays. The job they were to perform was:

1. To tempt the passerby into wanting ice cream, by appetite appeal.
2. To identify the retailer as a Breyer's dealer.
3. To get in a last-minute sales appeal to the seeker of refreshment who might be equally satisfied by a cola drink, orangeade or malted milk.
4. To earn the dealer's good will by the advertiser's efforts to help him sell.

The strawberry box framed the lavish pile of giant berries which poured out realistically, in three planes; the delicious-looking ice cream was directly in front of this, subtly suggesting that fresh strawberries were used in Breyer's Ice Cream. This construction shipped flat, and when taken from the carton, fell into place automatically, thus insuring easy and correct set-up in the store.

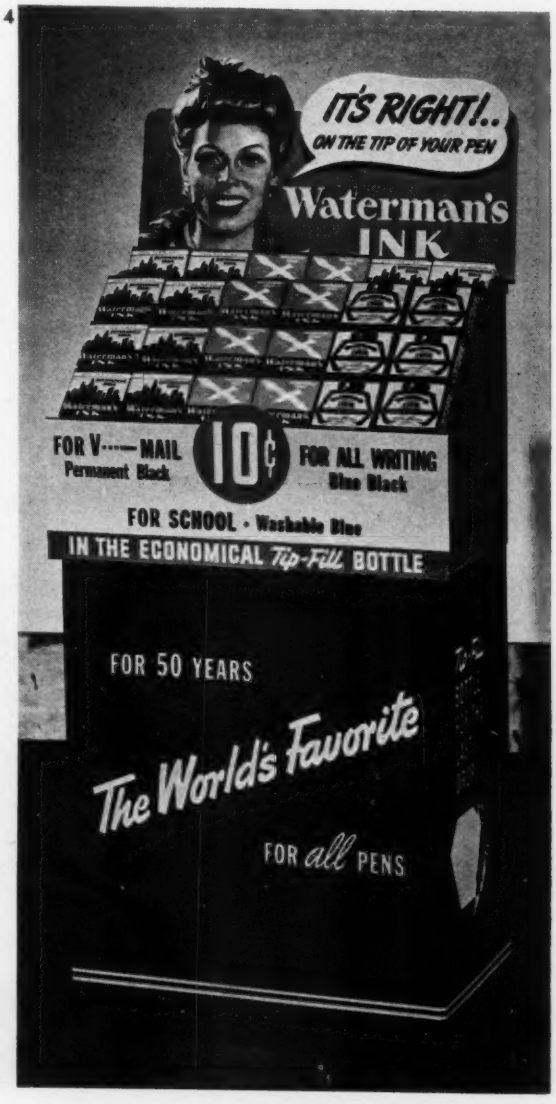
The Diamond Dyes display is a combination shipping carton and counter merchandiser. It has a bottom cover which swings back, automatically forming an easel which supports the box in tilted display position. The dealer only has to remove the box from the corrugated container and place it on his counter.

This is one of the most direct and important forms of display advertising: the counter merchandiser whose

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3. The Pepsi-Cola girl is in a frame of simple construction. 4. Upper part of Waterman's merchandise dispenser permits separate counter use. Photos Einson-Freeman Co.

job is actually to sell. Counter displays should always be merchandise sellers, for the limited and valuable space of these selling-spots does not permit the use of flat cards and advertising regardless of the beauty of the subject matter portrayed.

The Kellogg Girl clutching the box of cereal so happily is another type of window piece which serves to illustrate how the display can be taken out of the flat card class by such an inexpensive touch as a three-dimensional package. This is just a two-sided box constructed to appear "real," and joined to the background by a glue lap. Small as the novelty is, it is a well-conceived touch that compels the consumer to see the box and to realize that children love Kellogg's. The novelty of just one real part on an otherwise flat card does the trick of giving the whole display realism.

The Philadelphia Whiskey book is a triple-edge sword whose purposes, besides the obvious one of selling whiskey, are:

1. To be important enough to demand a full window or the major part of one.
2. To cause an observer to associate Philadelphia Whiskey with the fine art painting on the display—so that he is left with the impression that both are of fine quality.
3. To give the type of display which the dealer will find ideal for a ledge display after removing it from the window, thereby prolonging the life of the advertising.

The Pepsi Cola circular frame is an elaborate and costly looking "reminder" to be hung at the soda fountains. Its rich effect belies its inexpensive construction, since it is merely a cardboard frame and very simple to manufacture. It was this sort of effect that we referred to earlier to illustrate why a dealer would rather hang a framed picture than a die-cut flat card—the frame dresses up his fountain, while a plain sign or card just adds more confusion to the mirror or back-of-the-bar already bedecked with signs.

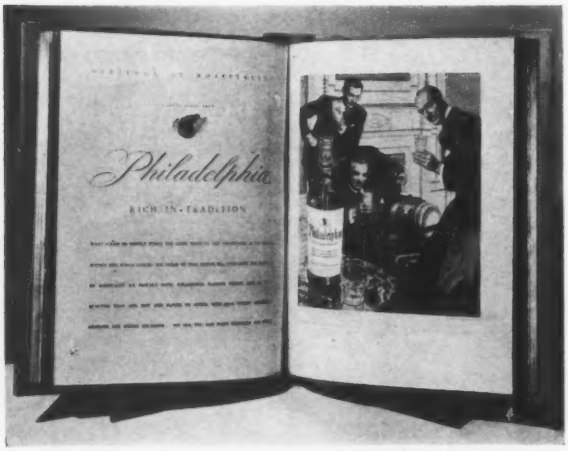
The Waterman floor stand is really a combination counter display and floor stand. The top is a complete unit by itself, to be used whenever the retailer can accommodate the display on his counter; for smaller stores which cannot devote their small and precious counter space, the addition of the base piece creates an island floor unit which usually finds a convenient place in a corner or against a wall. This combination is a top-notch merchandiser for a wide variety of drug, stationery and grocery products.

While no motion displays were permitted during the war, I sincerely believe that the return of peace will bring a return of animated displays in the form of whole "acts" instead of simple attention-getters. Then a message will be delivered at a glance, and a means will be provided to advertisers to portray sales-thoughts too complex for still pictures. This means of portraying an entire idea at a glance has a great advantage over present displays that must use a heavy copy-panel to put an idea across, for display advertising doesn't have a "reading audience," and a message must be conveyed quickly and impress itself upon the eye of passers-by.

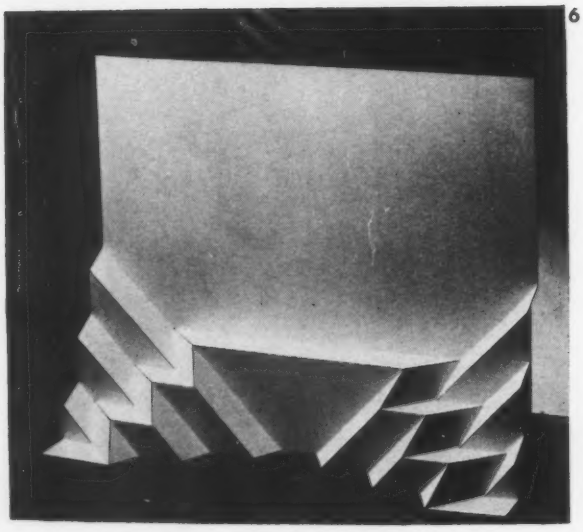
As a proof of the fact that display construction is not just marking time until the wars end, I offer a preview of a single example of the "display of the future," a development for the postwar showing the accomplishment of what had been considered an impossibility—the folding of a platform display in which both the tops and the sides of the steps are formed simultaneously, all of one piece, with no pastings and no joinings. It ships flat and opens automatically (illustration No. 6).

Numerous new constructions are being prepared for postwar advertisers *now*. They will accomplish things in cardboard so far beyond anything available today that some of them may not be readily recognized as cardboard! Yet even the most advanced designs are really products of the past. The keynote of planning for reconversion to peacetime markets should be: to know the future, examine the past.

5. Dealers like simple yet artistic character of the Philadelphia Whiskey piece. Photo Einson-Freeman Co. 6. Blank dummy made from one piece of board—tops and sides of steps are formed without paste. Photo Richard Paige, Inc.



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Inside-store displays

by Merle D. Penny

All forms of advertising—and that includes advertising at the point of purchase—have effected an urgent transition from straight product selling to inspiring the cooperation of Americans in many essential wartime activities. It is a transition which must continue well into the postwar period to soften the impact of inevitable shocks incident to reconversion from wartime to peacetime living habits and standards.

Witness recent comments before the Association of National Advertisers. Henry A. Dinnegar, director of a division of the Office of Civilian Requirements, said: "The country relies on advertising to help prepare the people for the critical period just ahead when many products will be going back into limited production." James F. Byrnes, director of the Office of War Mobilization, had this to say:

> The United States has never before been engaged in a war which made it so necessary for all our people to be so fully informed . . . this is because total war calls for the coöperation of all alike—not once, but in a hundred ways . . . the need for the talents of advertising—advertising that serves the nation—will continue even after both Japan and Germany have been humbled, for the readjustment to normal living will also require the continued voluntary coöperation of every citizen . . . I sincerely hope that you will continue to inform, persuade and inspire the home front.

The areas inside retail stores offer numerous opportunities for displaying and getting across last-minute messages to a highly selective and susceptible audience. This is true from a straight product selling standpoint and just as true when wartime or postwar messages are involved.

The well-planned display message can urge active participation in a vital wartime activity, suggest some method of conservation, delineate ways and means of maintaining good health in spite of hectic wartime worries and restrictions, helpfully outline a manner in which ration points can be stretched to provide a suitable nutrition standard or extol the virtues of a product. In any case, that message will be reaching Americans who are in a most receptive frame of mind, for they have entered that store with buying intentions. Since they usually have to await their turn, their roving eyes have ample opportunity to catch and to absorb full import of such a message.

In the last 24 months we have learned a lot about how to assign definite wartime objectives to our advertising and merchandising messages. Now, as we intensify our postwar planning, this experience will enable us better to determine just how display pieces for use inside the store can contribute as much to reconversion as they have to furthering war activities. For it is a new world we will be returning to. It is not just a matter of returning to our mode of life as it existed prewar. We must raise our sights to the new objectives of a higher average standard of living here and abroad, higher values, new products, new desires and expectations—all this after

1. Counter display with construction which permits three different sizes of the actual product to be displayed; price of each is on removable tabs. 2. Carton in which soap is shipped becomes counter display by folding top back.

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successfully negotiating the pitfalls incident to immediate reconversion problems of re-employing about 10,000,000 men and women.

Vehicles for inside-store messages are many and varied. Counter displays come first to mind, probably because they are items developed to do a merchandising job in direct contact with the product itself, either by having one or more of the product packages incorporated as an integral part of the display, or by being included with an arrangement of the product packages out on the counter, within easy reach of shoppers.

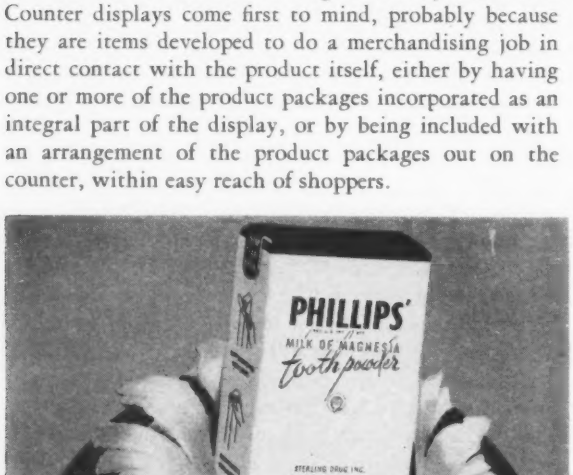
A counter display has two primary objectives: first, to sell the retailer on its merit as a real sales aid; then, having won a portion of the dealer's valuable "out front" display space, to influence shoppers to act according to the purposes of the display message. In accomplishing the second primary function, the display will be conceived to perform one or more of the following:

1. Develop *impulse* purchases by shoppers who entered the store with other purchases in mind.
2. Identify the product to shoppers as the one they heard about on the air, saw advertised in magazines or newspapers, on the highways, or car cards, posters or window displays.
3. Combat other point-of-purchase advertising sponsored by competing products.
4. Defeat competitive advertising in other media by last-minute persuasion that this product will give best results and greatest satisfaction.
5. Remind shoppers of forgotten needs.

There are specific functions for which counter displays can be designed, some of the most common being to help the dealer sell related items, to demonstrate the product, state the price, feature combination offers, sample the product, outline special premium deals, describe a contest, introduce a new package, distribute supplementary printed material, dramatize product trademarks, feature and glorify stars on product-sponsored radio program. These are typical peacetime functions. In wartime, display pieces can be assigned other essential jobs: they can identify products in new wartime dress; explain and illustrate methods of conservation or ration point extension—either *of* the product, or *with* the product; go all-out on some wartime theme, thus furnishing another reminder to Americans to coöperate.

In developing a counter display, there are certain characteristics which must be kept constantly in mind

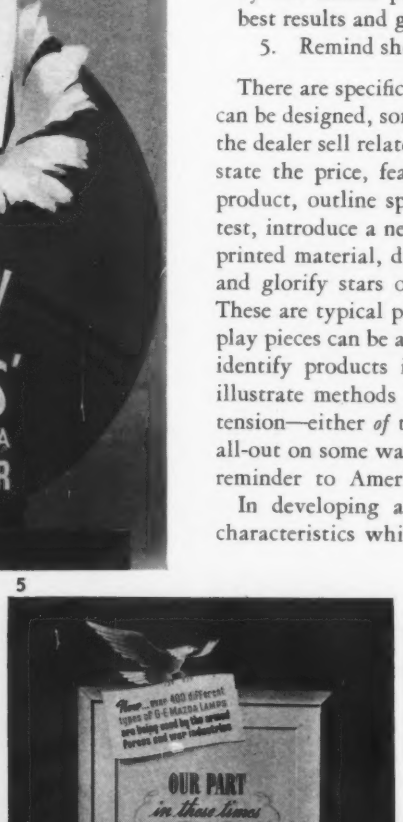
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3. Phillips makes a virtue of necessity—a counter display makes capital of a wartime package. 4. A Goodrich hanger for store use depicts those who willingly go without footwear while the copy presents statistical information about what conservation is achieving. 5. G-E faces unavoidable merchandise shortages with displays for store which will build up consumer good will. Photos Forbes Litho. Manufacturing Co.

and weighed with deliberation in order to determine the relative importance of each in the final make-up. A counter display can be made to perform several functions, but too many tasks must not be assigned lest it fail to perform any one satisfactorily. Basic appeal, merchandising idea, art treatment, construction, extra or novel features, copy slant, economical production—these are some of the features to be considered most carefully.

For example, copy on counter displays need not be as brief as copy used on posters and window displays, because the viewer is a lingering shopper who has a longer time in which to absorb the story and comprehend its implications. There should be a fast-reading identifying element, plus more leisurely copy and illustrations for the information of shoppers who may desire to know more about the product and its potentialities—what it will do, what can be done with it.

As to the types of counter displays, there are many, but most will fall within a few general classifications. The simplest of all is the counter display card—a single-plane card, either square-cut or die-cut into some interesting and eye-arresting shape. It stands on the counter, either alone or with an arrangement of the product packages. This single-plane display card can become a product display card by being so constructed that a number of the product packages can be fastened to its face with rubber bands or metal clips, or held in place by die-cut tabs or fitted into die-cut openings.

Then there is the combination shipping and display container—a type of display piece that is filled with the product by the manufacturer. It protects the product in transit, and all the dealer has to do is to raise the lithographed or printed cover into display position.

Design and construction can be applied to the development of a counter display so that it is built around one or more actual product packages which form an integral part of the counter display on special shelves, in die-cut openings, or on supporting easels. This type of display is excellent for helping the retailer sell related items.

The open display basket, another type of counter display, presents product packages in an interesting jumble display which, by its very nature, invites the shopper to pick up one of the packages for inspection—thus performing that decisive sales function of getting the product into the hands of the shopper. When that is accomplished, the sale usually is more than half made.

What has been said about counter displays applies in greater or lesser degree to the other types of inside-store display material.

1. ***Floor stands*** in which the product is piled or jumbled for easy access. The floor stand commands a shopper's attention out on the floor of the retail store.
2. ***Life-size floor displays*** which stand in the store, rub elbows with and deliver their messages to the waiting shoppers.
3. ***Wall cards or posters*** designed in bold poster style, hammer home messages by means of dynamic illustrations and terse copy.
4. ***Banners or hangers*** can be issued singly, or in sets to hang on strings or wires in the store to illustrate and demonstrate various desirable features of the product or product uses, or to key in with some particular sales drive, war drive or other event.
5. ***Festoons*** to be strung up in the store or to be tacked up as back-bar displays. These are particularly suitable for some types of retail outlets: they can be designed in many pleasing and colorful styles and arrangements to add life and decoration to the retail store while reminding again of the sponsor's product or message.
6. ***Calendars*** can be designed to put across dramatic pictorial messages while they hang there on the walls of retail outlets, serving dealer and shopper alike with a record of the days, weeks and months.

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6. Life-size cutouts for store use are invariably "stoppers"—nearsighted people sometimes speak to them! Alka-Seltzer presents this one with miniatures, for use on counters. Photo Forbes Lithograph Manufacturing Co.



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7. Paper shortage makes it difficult to obtain board on which to mount displays—but there are store hangers, unmounted, which save paper but deliver war messages, product reminders. Photo Forbes Litho. Manufacturing Co. 8. Pen makers, unable to meet demand, keep names alive by featuring ink. Photo Philipp Lithographing Co.

The determination of which items are to be used—or how many different items—to present one theme or product story, will be influenced to a large extent by several factors: the product itself is, naturally, of prime consideration. Then must be considered the kind and scope of market, tie-in with general campaign, seasonal factors, distribution problems, attitude of retail outlets, change intervals, competitive conditions, budget, economical sheet layout for various production steps and specific objective of the display pieces.

Additional advantages are inherent in inside-store materials, as in all point-of-purchase material, that do not exist in other forms of advertising. Firstly, messages on point-of-purchase display pieces reach the shopper at the vital last minute before the sale or purchase is consummated. Secondly, there are controls: advertising and merchandising messages on point-of-purchase material can be focused on specific audiences according to your wishes and your selection—this can be by geographical limitation, if desired, or the messages can be keyed to reach a certain type of buying power according to income level, nationality, etc. Furthermore, the effort can be intensified in certain areas in keeping with the amount and kind of buying traffic in those areas. In other words, control of quantity and quality are yours to exercise—you can reach a desired number of retail outlets in a selected area with the amount and kind of display material you deem suitable for that area.

American advertisers possess proven skill in influencing public buying habits. They now must apply this skill to the new and necessary job of inspiring Americans to back up our fighters and our government in various phases of essential war activity. Later on, they will employ this ability in facilitating this country's reconversion to an enduring peacetime economy. They must back this effort with the same creative ingenuity and dynamic pictorial and copy technique that projected America so far ahead of other nations industrially, and made the American standard of living the highest in the world. They should do this with their point-of-purchase material as well as with all other media.

And let's be realistic about it, on a long-range basis: while they are doing this urgent and worth-while work, they will be keeping their trade name and product alive in the minds of Americans. That's mighty important, too, for those industries and concerns which have maintained contact with consumers will have kept their product or their service active in the eyes and thoughts of our huge buying public. By doing this, they will be in much better position to snap into peacetime production and merchandising activities than concerns whose names and trademarks become lost and forgotten in this hectic, war-torn economy of the early Forties. They will be able, immediately, to shoulder and successfully fulfill their responsibilities in helping America secure the peace our fighting men are dying to win.

Merchandising with corrugated boxes

by Paul Meelfeld

From the days of its earliest development, the corrugated box has always had as its basic packaging objective the protection of the product. Today that objective is still first and foremost, yet even a brief survey of modern merchandising will show a great number of plus-values achieved through use of corrugated boxes. The reason for the growing importance of the corrugated box as a factor in merchandising is simply stated: Corrugated helps to make the product easier to pack, easier to ship and to handle, and easier to buy.

Let us discuss these values of the corrugated box as they relate to the three major steps in the merchandising chain,—manufacturing, distribution and purchase. First consider the manufacturer—and because merchandising implies competition, let us assume that this manufacturer is making a product to sell under strong competitive conditions. The value of the corrugated box is of course not limited to competitive products but these offer to corrugated its greatest scope. The corrugated box offers to the manufacturer protection for his product, and usually it offers a packaging and shipping process which saves him time, money, manpower and material. Merchandising begins with manufacture, and properly engineered corrugated boxes, in addition to their assurance of product protection, make it easier to handle and store the products where warehousing is required.

One of the most important plus-values which the manufacturer can get through the use of corrugated boxes is in the display possibilities which can be built into the box. Package engineers, as revealed in many of the illustrations in this article, have literally "gone to town" in creating corrugated boxes which can be transformed almost instantly into effective and sales-producing displays.

The properly engineered corrugated box, designed for merchandising as well as protection, has only begun its work when it gets the product to the retailer. While ordinary boxes may be thrown into the back room

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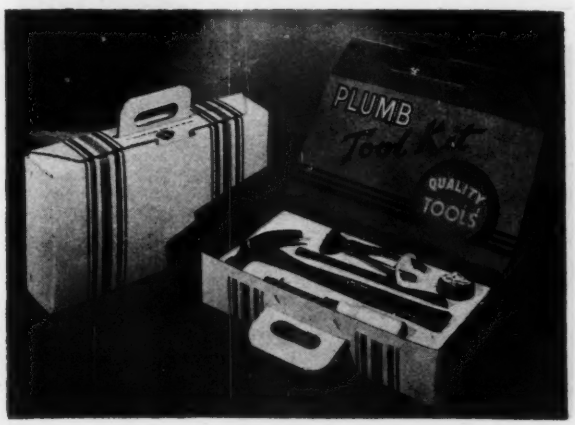


1. and 2. Teakettles and camp stoves, properly packaged, are easy to display and easy to take home. 3. Tool sales increase when the related items are packaged in a handy carrying case. 4. A tea container quickly becomes a display. Photos The Hinde & Dauch Paper Co.

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of the retailer's shop or store, the corrugated box—designed to merchandise—follows the product right out onto the sales floor.

Retailers haven't much time for complex display problems, and they like corrugated-packed products where the display is "ready-to-go" the moment the product arrives. These boxes win counter space from dealers not only because they are attractive and easy to set up, but because they perform a real sales job, too. They show the product—perhaps a unit of one or more products; they afford space for colorful and informative copy; and they often present single or multiple units, ready packed, for take-with sales. Obviously, such products win favored treatment by the dealer.

The wholesaler also looks upon corrugated-packed merchandise with favor. He, too, appreciates the greater handling ease given by neat, yet strong, corrugated packages. Product identification makes a running inventory easier, while the sealing technique used on corrugated boxes makes pilferage losses more obvious and therefore less likely.

All along the line the corrugated box is helping to deliver the product safely, to identify it and to make it easier to handle. Perhaps it is stretching a point to classify these factors as elements in merchandising, yet it cannot be disputed that they work to the product's advantage rather than otherwise.

Finally, there is the consumer to consider. He is still subject to the basic buying motives, and an attractive corrugated box display gets his attention, shows him the product and tells him about it. He makes his choice on the basis of facts, and when consumers know what they are getting, they are seldom disappointed. Product identification is stepped up; repeat sales are increased.

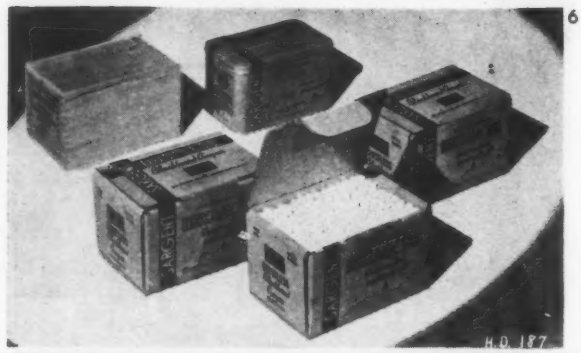
Our illustrations show several examples of modern merchandising with corrugated boxes. A brief analysis of each is sufficient to demonstrate how expertly the corrugated box is engineered for the specific task. Corrugated is a flexible merchandising tool in the hands of expert engineers, as the variety of these products proves.

Package engineering is much more than the mere construction of a box; it is the science of creating a package which will utilize fully every merchandising value inherent in a package. Product protection, handling ease, display possibilities through the use of color, promotion of multi-unit sales—these are but a few of the objectives that package engineering can aim for, and get, in corrugated boxes.

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5. Hammers sell faster in cartons that bear a sales message. 6. Chalk handles easily in corrugated boxes. 7. Corrugated gift cartons can greatly increase holiday beer sales. 8. Display panels on the container help the sales of dog food. Photos The Hinde & Dauch Paper Co.

Wood displays and cabinets

by Milton Weill

In planning for reconversion, we find an alertness on the part of many manufacturers who are looking ahead to the end of the war and who are now planning to break into the market with attractive displays. Designers and display manufacturers are busier anticipating the needs of the customers than they have ever been. In many cases, displays have been designed and are ready for manufacture the minute the war is ended. This gives to manufacturers the opportunity to develop their displays at leisure, to get them into the market well ahead of their competitors.

In normal times, the wooden salesman was an important means of merchandising a new item, of reintroducing a product on which the sales had slowed down, of building good will. Now, when it is especially important for aggressive, farsighted merchandisers—who view problems from a long range point of view rather than from a short day-to-day restricted angle—to neglect no effort to keep their product and their name before the consuming public, the wooden salesman has an even bigger job. He has been especially useful as a constant reminder in keeping a product before the eyes of the consumer on retailer's counters, since displays—because of restrictions—are not being used to the same extent as formerly, and competition for consumers' attention is less keen.

One cosmetic manufacturer this year had the courage to work out a merchandising deal, as in past years, and the success of this effort was obvious from the start. Other manufacturers had planned their programs in advance and were therefore able to continue the use of displays which had always been such a fundamental part of their selling effort. This has been true even in those cases where the product was so widely in demand that it was no longer a selling problem but rather a manufacturing problem. In those cases, obviously, the display was used not to help in the actual sale but rather to keep the product prominently before the ultimate user. In that way, continued good will is created and either the advertised name of the product or the product itself is emphasized in the consumer's mind.

Farsighted manufacturers do continue to use displays, and in their creation and design they employ whatever materials are available. Many, particularly in the cigarette field, are now using wood in place of metal. Wood displays, because of their permanence, their relatively simple construction, and the variety they offer, continue to be requested more than any other type of constructed display. They are easy to build, and if so desired, it is possible to produce even a small quantity with no large initial investment in dies, for wood can be cut and shaped almost at will. Furthermore, all sorts of fancy shapes can be created in this medium.

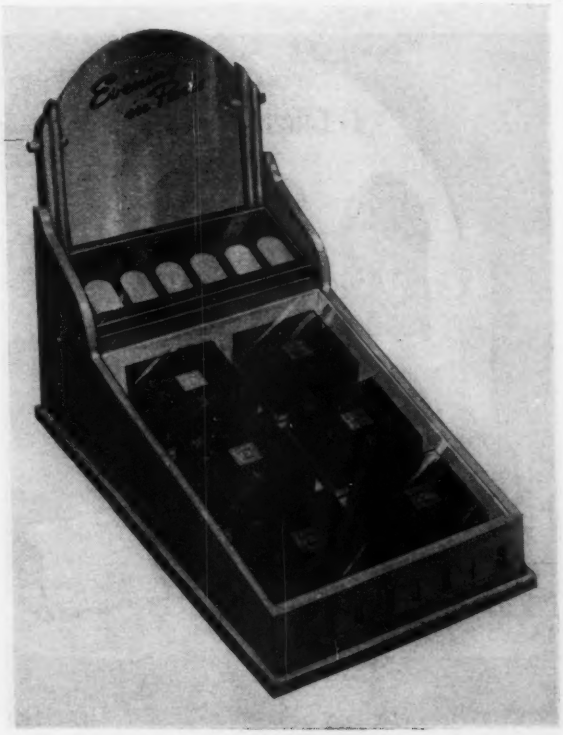
In addition to their reminder value, wooden displays have other merchandising tasks to perform. Often, action and stunt devices built into the display urge the customer to "try me," and effect a sale while the proprietor is busy elsewhere. Annoying delays are thus avoided. Therefore, storekeeper, jobber and manufacturer can well be enthusiastic over the fact that they may still use wooden display set-ups. Stock control, though not as important as it once was—stock maintenance being more important—can also be aided by wooden containers which show, at a glance, just how many of any given item have been sold.

Dealers have particularly welcomed displays because they help make up for the absence of merchandise with which to lay out windows or counters. Dealers, therefore, are all the more grateful for the coöperation of those manufacturers who continue to merchandise with the dealers' problem in mind.

New items—with the exception of military items—are not as numerous now, and the moving of dead goods is not a prime consideration today. Therefore, the sheer functional service performed by wooden displays is of paramount importance. The permanence of wooden displays makes it possible to refurbish them from time to

1. A wood display like this one can lend itself readily to an aggressive type of sales campaign, one which is capable of extending over a long period of time and of producing cumulative effects. Photo Arrow Manufacturing Co.

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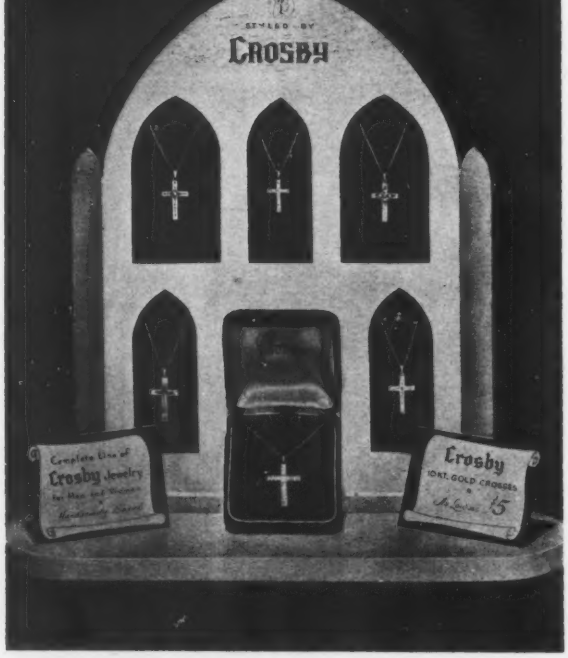
time, even if they have been out of use for a considerable length of time.

In the general wood field, natural wood finishes continue to be predominantly popular. While certain types of hardwood are difficult to obtain, they are nonetheless easier to come by than is metal. Once the quantity of wood required for any display has been secured, the matter of decoration is open to the same type of artistic ingenuity as in the past. As a matter of fact, beyond the restriction in the use of acetate for window effects, all other types of decorative materials are available. Screening as a method of imprinting an advertising message can be had, as can gold stamping, lacquer finishing, etc. And glass is still available for window effects.

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In the jewelry and cosmetic fields where wood displays, combined with glass, velvet coverings, decorative ornamentations, lighting effects, etc., have been effectively used, such counter displays continue to be important factors in the development of merchandising plans. In many cases, of course, new products, new designs of old products or additions to the line can be introduced by the use of counter merchandise displays.

Jig-saw equipment has been employed to add a livelier effect to some wood counter displays. Often comic figurines made with the jig-saw have been used as part of a display in order to call more attention to the featured items and enliven the whole effect.

In many cases, cardboard combined with wood has served a useful display purpose. Mirrored displays continue to be popular. In some cases a mirror is merely incidental, in others it is the predominant note. It may have the practical value of drawing closer to the display the female customers who are interested in looking at themselves at the same time that they look at the merchandise being featured.

Despite the fact that some types of wood are difficult to obtain, generally speaking, wood displays are still available as an important aid in merchandising plans. Manufacturers may continue to look to this field for the effective display of their product on dealers' counters, displays which build good will and say, "remember me."

2. The natural finish of wood presents a warm, neutral tone which makes a harmonious background for the "Gift of a Lifetime," while clever cabinetry provides convenient shelves for the merchandise display. 3. The dignified and churchly atmosphere appropriate for religious jewelry is achieved by means of a wood display. Here the permanence and stability of setting enhance value of product. 4. Adapted to constructional ingenuity as well as to decorative treatment, this wood display provides an effective medium for presenting all the sales points of Tuk-Away Billfolds. Photos Arrow Manufacturing Co.

4



Corrugated display materials

by Paul Thompson

The public looks forward to a postwar world of sleek, streamlined automobiles, simplified, factory-packaged kitchens, bathrooms and even entire homes. In point-of-sale advertising, too, postwar will bring a continued development in simplified, streamlined designs.

Like the projected postwar homes, the display backgrounds will be planned in close coördination with the display and its selling message. The trend towards smoother, less fussy backgrounds will continue, with a greater degree of factory fabrication to prevent loss in effectiveness when finally installed. Display corrugated will have a greater part in this program since it provides structural strength and three-dimensional color.

A rigid material shipped in rolls

A rigid, or semi-rigid material which can be shipped in rolls, display corrugated lends itself readily to the requirements of manufacturers' displays. The corrugating process converts lightweight papers into a material which has a one-way rigidity, which can be shipped in rolls. It is sufficiently rigid to stand erect when unrolled, requiring only the minimum of support.

Corrugated can also be converted into fully rigid panels by cutting a line across the corrugations along each edge of the roll, cutting through the corrugations but not touching the smooth surface. This forms a narrow panel on each side which, when folded back, makes the material fully rigid. While this cross-cutting can be done by the installation man, it is generally furnished cut to order by the manufacturer. This device enables material to be shipped in compact rolls and then transformed by the installer into a rigid display set or background.

Most advertisers are well acquainted with the principal type of color corrugated which utilizes the corrugating process for its three-dimensional beauty. The back of this material is smooth, while the face is made of colored paper, corrugated. This adds depth and form to the color, so that there is a continuous subtle pattern of highlights and shadows in the color. Most color corrugateds have corrugations 1/4 in. in width, with newer types having convex or concave flutings, 1, 2 or 4 in. wide. Corrugations always run the width of the roll, which may be up to 8 ft. wide.

Structural corrugated

Display corrugated may also use the corrugations only for their asset of rigidity, to support a smooth structural material that uses heavier stock for the facing. When unrolled, it has the appearance of composition board or solid panels. This has the advantage of easy shipping.

Printing on corrugated

Display corrugated can be printed in a number of ways, either on the corrugations or on the smooth backing. The corrugated surface can be printed before corrugating, the design exaggerated when printed so that it condenses to its natural width when corrugated. The actual corrugated surface can also be processed by air-brushing.

The smooth surface of corrugated materials is becoming more widely used in its printed form. This can be done either by printing the rolls of paper before corrugating or by silk-screen processing after corrugating. Continuous roll process permits designs as wide as 60 in. repeating every 48 to 72 in. This allows the use of multiple-color, printed from three-color process.

While the silk-screen process is limited currently to application on sheets, this process is now being developed for continuous roll printing, to print directly.

Novelty materials and effects

The advertiser has a wide choice of materials and effects at his command. Display corrugated can be laminated with fabrics or crepe paper, and can be given special surface effects. These include "flocking" to give a velvety effect, "fluttering" with metallic or mica particles to give sparkle. Paper used in corrugating can also be embossed with novelty surface effects.

Display corrugated can be die-cut like cardboard in roll or sheet form. After die-cutting, the material can be shipped in roll form.

Methods of use

Backgrounds—Corrugated display papers are used most frequently for backgrounds, to provide settings for lithographed and merchandise displays. They provide an easy way to secure a change of background or to hide permanent window backgrounds. Corrugated can be easily cut with a pair of shears so that the installation man can readily make decorative effects.

In addition to the many standard color and construction corrugateds, the advertiser has available a wide range of accessory or design materials. These include die-cut effects like icicles and picket fences; or printed materials like clouds, trees, ocean waves, ice-blocks, woodgrains and flowers.

Columns or side-wings made of corrugated are often used to accentuate lithographed displays. Properly used, they can add height, width or depth to the display settings, are helpful in fitting the display to the window.

For displaying merchandise—Probably no other method is as widely used for displaying merchandise as the versatile pedestal made of corrugated. Through the use of inexpensive, pedestal cap sets, a range of sizes in round and oblong pedestals can be made in any height, possessing the advantage of a material that can be shipped in compact form and quickly installed to fit varying needs. Merchandise can be displayed on the face of the pedestal as well as the top, by fastening it to the cor-

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Employed like the background of a stage, the corrugated background here augments the attention value of Wyeth's "Prescription Pharmaceuticals" display which is composed of a number of display units. Photo Window Advertising Inc.

rugated or by inserting cut-outs in the corrugated. Other methods for displaying merchandise include ledges, special platforms, shadow-boxes, sloping floors and horizontal rolls; all of which are easily constructed due to the one-way rigidity of corrugated. These devices, too, can be cut by the installer, or furnished pre-cut.

Complete displays—For the manufacturer who uses only limited quantities of displays, an economical answer is the complete display of corrugated, processed by silk screen or spray gun. In the central unit of the Vogt ice-cream display, for example, a single piece of corrugated has been sprayed with a message, the columns being an integral part that provide the necessary support, thus being utilitarian as well as decorative.

Another answer to displays in limited quantities is the use of stock pictorials available through display manufacturers. These can be furnished with or without the advertiser's imprint. They are particularly desirable for use with suggested window set-ups for related-item or mass window displays, where the window is to be installed by the retailer.

Such pictorial and accessory materials represent the type of material normally bought by the retailer, so that he is well acquainted with its value. Since these suggested set-ups feature a variety of merchandise with maximum sales coverage, they stand a particularly good chance of being used.

Interior wall and ledge displays—Many stores make good use of wall areas for valances and ledge advertisements. These can be printed or processed in roll form with a corrugated backing that prevents sagging.

Methods used to buy and ship displays

Complete set-up to installation house or retailer—In this case, the display and materials are shipped complete, with detailed instructions to the installation house or the retailer. Assembling may be done by the advertiser, the lithographer or manufacturer of display materials. This method insures complete control over each display, as the installation house or retailer receives the lithographed items, dummies and display materials together.

Drop shipments by display manufacturer—Most manufacturers of display materials will assemble and drop-ship these materials as ordered by the advertiser. This method relieves the advertiser of the detail of shipping and insures that the installation house or retailer will have the correct material and will not be handicapped by shortages in local stocks. Like the first method, it insures use of correct materials and colors.

Bought by installation house—Under this method, lithographed displays and dummies are shipped to the installation house together with complete instructions on the use of other materials which may be purchased locally. If these should not be available the installation house would have to make its own substitutions.

Manufacturers' advisory service—Leading manufacturers of display materials maintain staffs of men who have graduated from installation work and know the answers to all the problems of display. They are well acquainted with all the technical processes used in the manufacture of displays and accessories, and are well equipped to render both advisory and creative service.

Crepe paper for displays & backgrounds

by C. E. Wright

Nearly every kind of paper has at one time been used as a background for adding more sales punch to one or another kind of display. The vendor of racing sheets uses winning tote tickets as a background to advertise his wares. The Declaration of Independence is displayed against a background including a greatly enlarged copy of itself.

But the papers to be discussed here are only those most commonly used as the backgrounds of display. These may be plain, printed with stock designs, or printed special-to-order. They include the ever-popular crepe paper; plain or embossed metal foils; papers bearing designs to simulate leather, textiles or wood, or other patterns; flexible corrugated papers; and some types of fancy box papers.

Available materials

This multiplicity of background papers is most desirable. Variety is the essence of good display advertising as of any advertising. Accordingly, the aggressive manufacturers and the aggressive dealers familiarize themselves with all the wide range of papers, and use them to create constantly fresh and new decorative effects in window and other displays, always seeking the background papers that will do the job best. Many of the available materials combine very effectively—the less expensive crepes in their beautiful colors for large areas, the striking foils, flints, woods and leathers for accent—and the many types of corrugated papers for three-dimensional, structural effects.

For timeliness—and every good display is timely—there are printed panels and borders, large enough to dominate the background and give the entire display the seasonal touch that can be relied on to sell merchandise. There are also seasonal borders, in continuous rolls of attractive design, to tie the entire interior of the store in with seasonal or holiday spirit.

Corrugated papers now are available in a wide variety of surface textures with novelty embossings and herringbone effects, and not only with the conventional small flutes, but also with very striking wide flutes of classic beauty and exceptional strength. Further, non-rigid background papers, such as crepe paper, can be laminated to corrugated board for an even greater variety.

From the wide range of materials and printed designs now available for displays even those retailers and manufacturers with the most limited requirements can create scenic effects that up to a few years ago were possible only to the very large department store or to the manufacturer who purchases display materials in large quantities. Similarly, the manufacturer who purchases display materials on a special-to-order basis today can command display effects of greater beauty and stronger sales punch than ever before.

The principles explaining the purposes and power of these many different background papers in advertising and selling, and the criteria governing the selection and use of them are the same for each of them. Therefore, it is practical to write about all of them in terms of a single one, for example, crepe paper. For crepe paper is familiar to everyone; it is extremely adaptable, that is, capable of yielding an extremely wide variety of decorative effects, and it can be used to illustrate every basic principle and use of background papers save the structural.

Purpose of background

But first: "Why have these backgrounds?"

The answer will apply not only to the backgrounds of displays, but also to valances, trims, and panels for all sorts of units, including windows, show cases, counters, demonstration tables, floor racks, wall areas, etc.

A satisfactory background will increase the effectiveness of a display because it:

1. Attracts attention, e.g., by providing color.
2. Ties in the merchandise or service being sold with the life of the prospective customers by creating an atmosphere that suggests the way to use or the place to use the product, and its origin or nature. This establishes a point of contact with the customer and suggests the purchase of the product to fill a need at Christmas time, on vacation, in the home, at the beach, or in any other timely manner.
3. Enlarges the unit of display by extending the lithographed card or the actual merchandise in such manner that it seems to fill the whole window, counter, rack, or other display unit.
4. Focuses attention on the centerpiece—acts as a foil for the lithographed card or the merchandise.
5. Closes off the display from distractions which might otherwise divert the consumer's attention; for example, the background in a window shuts out movement in the interior of the store.

Desirable characteristics

To get results for which a good background is intended, the paper used should have as many as possible of the following characteristics:

1. ***Color***—To attract attention, the colors should be striking, unusual. Also, there should be *a wide range* of colors; a well-known crepe paper manufacturer, for example, carries some 50 different colors in stock, which offer the decorator the opportunity for unusual and dramatic effects.
2. ***Texture***—Not only color but also sheen or surface interest is another characteristic that a background paper should have. Foil papers have brilliance and a mirror-like quality useful on many occasions.

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Papers carrying wood, textile, leather or other designs are sometimes just the thing. Crepe papers offer a texture similar to expensive fabrics, and are reversible; that is, they show a satin-like sheen on one side, a dull, velvety texture on the other.

3. ***Strength***—For ease of handling and permanence during life of display.
4. ***Flexibility***—Also makes for ease in handling. To illustrate, visualize the manner in which a background paper like crepe can be used to wrap posts or other objects, turn corners, conform with or conceal an uneven surface, be compressed into a small space, or spread into a large one.
5. ***Adaptability to many treatments***—This refers to special effects obtainable. Crepe paper, for example, can be pleated, draped, woven, and made into tubes; or it can be given a waved or rippled effect, and petal, fluted, or ruffled edges. Crepe can also be used to make fringes, nets, crushed festoons, Jacob's Ladders, lanterns, and decorative cut-out patterns as well as imitation plants and flowers of all kinds. This adaptability is a most desirable characteristic when it comes to creating an atmosphere to fit the product.
6. ***Opacity***—Necessary to shut off outside interference which might otherwise disturb the onlooker. Crepe offers an advantage here in that it is opaque to vision, but translucent to light shining behind it. Also, this degree of translucency can be varied by the degree to which the crepe paper is stretched.
7. ***Adjustability***—Because the windows vary in size, the background paper sent with a display must be so planned that it can be adapted to various sizes and shapes of windows. The stretchability of crepe suggests its advantages in this connection.
8. ***Universal familiarity and availability***—Important points when considering distribution of window displays on a national scale. Crepe paper in its wide range of 50 colors is available in almost every city and town, enabling the retailer, or the manufacturer's installation man, to get materials with a minimum amount of trouble for adding to a window. When the manufacturer is asking the retailer to install the display, it is of immense help that almost everyone has some knowledge of how to work with crepe.
9. ***Ease of installation***—The strength, flexibility, and stretchability of crepe paper make it especially easy to manipulate.
10. ***Low cost***—This factor, along with the general availability of crepe, makes it a good material for national advertisers to use in displays having nation-wide circulation.

Printed-to-order background paper

A background paper printed with the manufacturer's trademark or other identifying copy brings special added advantages.

1. It enables the manufacturer to tie in his display closely with his general advertising, the trademark on his product, letterhead, etc.
2. It makes for more attractive and more colorful displays because the background can be printed in special colors, to tie in with any theme color which the manufacturer may wish to feature.
3. Printed background papers provide an excellent means for creating just the right atmosphere to suit the product and the season of the year.

Finally, a retailer often changes only the merchandise or a lithographed card in a window and allows the background to remain—as almost everyone has observed many times. And, as long as a manufacturer's trademarked paper is left in the window, he continues to cash in on its benefits, even though the remainder of the display has been changed.

1. and 2. Tastefully installed crepe-paper backgrounds which have vertical and diagonal lines unobtrusively drawing the eye to the products, will pay dividends in sales results. Whether to install one-product windows or a variety of products—these two conflicting principles will probably never be unified. However, one-product windows certainly are in a much better position to take full advantage of the virtues of crepe-paper backgrounds. Photos Window Advertising, Inc.

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1. The syndicated store displays its goods in line with careful study of store traffic, of slope and height of counters. Packages are given fullest opportunity to exert their own appeal. Photo "The Syndicate Store Merchandiser."

Package & product display in the store

The consumer goes to the retail outlet in search of a product to satisfy some desire. This axiomatic principle is frequently neglected in the preparation of packages and displays, is often overlooked by retailers, and sometimes even forgotten by merchandising experts. The purchaser, however, is susceptible to every impression created by the store window and by the merchandise displays in the store.

Of the various types of retail store in today's merchandising picture, those which evidence the most studied application of this principle are the modern supermarket, the syndicated "Five and Ten's" and the department store. Each of the three has its own peculiar problems and conditions, none of which could be considered interchangeable with the others' because each applies the principle in accordance with its own needs. However, a discussion of these three will be found helpful in facing similar problems in practically every kind of retail outlet.

The supermarket

Aided by the close relationship with supermarket operators, resulting from McCall's Meal Planner Service for large, combination, self-service food and grocery markets, a limited test was made to evaluate some of the factors involved in competitive pricing and display of glass-packed foods under actual working conditions.

The principal value of this study lies in the fact that it is a signpost or roadmarker showing which way to go. There would be no point in detailing the actual results of this study now. The figures gathered then could not possibly establish hard and fast conclusions applicable today, for marketing conditions as they existed in January 1942 may not be at all typical of the postwar period. From this study, however, may be derived a blueprint which any manufacturer may use in plotting his own course. Concretely, the things that he would want to determine would fall into two classifications: first, consumer reactions; second, merchandising factors.

Under consumer reactions, he would want to learn, for instance, whether women feel that glass-packed food items generally are more desirable. He would want to know if they think there is a real advantage in seeing what they buy.

Under merchandising factors, the manufacturer would need to determine whether his particular products could be sold successfully, in volume, at a higher price than competing products in other types of containers. For his glass-packed foods, he would have to determine "the zone of reasonable pricing" in relation to volume sales and to the same or similar foods in other types of packages. He would also try to learn whether this "zone of reasonable pricing" were applicable to all

NOTE—For material in this article we are indebted to Preston J. Beil, editor, The Syndicated Store Merchandiser; to members of the Display Department, R. H. Macy & Co., and to the Research Division of the McCall Corp.

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glassed food items or whether such pricing must be determined for each individual item. He would be very much concerned with the types of merchandise displays most effective in moving glassed foods in volume, want to know whether such displays should be in combination with similar displays of the same foods in other containers or whether separate groupings of glassed foods should be displayed. He would try to learn what happens to sales of canned foods when the same foods are displayed simultaneously in glass.

From the point of view of the designer, the container manufacturer and the manufacturer of packaged consumer goods, it would appear that this type of approach should prove invaluable in getting up-to-date and conclusive answers to each of the questions raised.

On the basis of the vast consumer-goods packaging job ahead during the postwar period and the relative dearth of valid data now available, it can be said that market research has barely scratched the surface.

It seems safe to predict, therefore, that more extensive and better marketing research in the field of packaging not only offers big sales, merchandising and advertising opportunities, but represents the top trend in postwar package planning.

The syndicated store

Despite all the dressing up of the "Five and Ten's" in recent years, they remain the department stores of the masses, and package design and display must be slanted to meet their peculiar problems.

The syndicate or variety store depends for its success on the offering of great varieties of low- and medium-priced merchandise—from toilet goods and notions to piece goods and ready-to-wear. This tremendous variety of merchandise is displayed by departments on open counters for customers to see, pick up and feel, handle and buy—with a minimum of personal presentation.

While higher-priced lines have been added to the original five- and ten-cent price range, the display principle remains roughly the same. Whether the item sells for five cents, ten cents or for one dollar, the customer knows she can walk into a syndicate store, look around, pick up anything she sees, feel it and put it back.

Before the war, syndicate store salesmen were gradually being trained to render more helpful service—a long step from the original conception of the salesgirl as a mere change maker and package wrapper. With the advent of the war, sales personnel in syndicate stores started to turn over rapidly. Today the manager of a variety store is happy if he has sufficient women or girls to give the barest essentials of service at his counters.

This will change after the war, because the syndicate store is trading up with the masses. Better-looking and larger stores bring better quality merchandise and more variety in price lines. Higher prices require better display and more salesmanship. But just as these stores will always be known as the "Five and Ten's"—no matter what their top prices—so display will remain basically the same in most departments.

Although display is about the same in all variety syndicates—from F. W. Woolworth to J. J. Newberry, S. S. Kresge, G. C. Murphy, McLellan Stores, S. H. Kress, etc.—each company has its own little peculiarities or variations of the basic idea. All, however, divide their counter tops with glass partitions and wood shams. These divisions of the counter are important to the manufacturer designing a syndicate store product, because it is this closely packed, yet neatly grouped, type of display that makes correct package design so important.

The fact that these divided sections of each counter are usually variations of standard 4-in. and 8-in. units, suggests that packages and carded items should conform to these standard sizes. If they do not, consider this fair warning that the store managers will take matters into their own hands and clip off the sides or top of oversize cards, or cram oversized packages into counter space in such a way as to reduce its original display value. Many a supplier of this market who has been forced to adopt a new type, shape or size container as the result of the war, has discovered what happens to off-size packages that no longer fit or "nest" well in standard-size bins!

Another "must" when designing a syndicate store package is the urgent need for large, easily read lettering, plus clear, simple "how-to-use" illustrations. "Tell 'em everything on the package and keep it as simple as possible" might be a "Five and Ten" package designers' slogan. While this is suggested to facilitate customer purchases, don't overlook the fact that the average salesgirl usually learns most of the facts about a product by reading the labels, instructions, etc.

Still another factor often overlooked in designing variety store packages is the resale price. Even a casual stroll through a syndicate store will show the importance these retailers place on large and numerous price cards and signs. Obviously every packaged item should have its resale price marked clearly—in fact, boldly—on the face of the package. Also, since packages are displayed in mass—on counters as well as in window displays—the design should be such as to increase attention value when grouped.

One last suggestion—the buyers and their associates in the executive offices of all the syndicates are glad to give any manufacturer advice on his contemplated package design. These men and women can easily be seen, and half an hour spent with several of them will prove extremely valuable in getting the right slant on your particular product. But be certain to see them *before* you spend your money on finished art work, costly plates, etc. Merely take a rough dummy package with you, plus a typed sheet of the copy you intend to include on the package. These men and women learned the variety store business the hard way—from the bottom up. They may not be professional designers, but they have a lot of common sense and know what makes "Five and Ten" packages sell.

The department store

Fifteen years ago, the problem of department-store display was indeed simple. Interest in dramatic backgrounds and props was completely unessential. A cur-

tain or painted wall was all the adornment the rear of a good window needed. The display man was a glorified sardine-packer who jammed merchandise into a window with a science all his own. There was little demand for ingenuity. In those times of easy business, the merchant believed that the more goods he put in his windows, the more goods he sold. Business came easy, so he never worried too much about finding out whether or not his theory was really sound.

After the boom, the depression set in and taught the merchant some fundamentals of window display he never dreamed existed. With the drop in business came the need for greater sales stimuli to salvage his rapidly diminishing volume. When item-packed windows failed to produce, display men were asked to develop new techniques which would bring in some of the lost business. Fortunately for the display profession, many conditions that existed at the time worked in its favor. There were obstacles, to be sure, but the kind that were bound to bring out the best in display men or cause their complete collapse. Happily, these stimuli helped make display the art and science that it is today.

One of the first things a plummeting sales volume causes any business to do is slash expenses. And display budgets were quick to get the ax. That meant that display men had to start thinking about substitutes to replace the lush fabrics, costly metals and expensive materials they had been using during the "hang-the-expense" boom era. During this period, those ugly wax mannikins that adorned so many store windows melted right out of the picture. Their warranted lives were brief because of their unpredictable reactions to atmospheric changes within the windows, and this rapid depreciation combined with their original cost made wax mannikins too rich for the blood of most retailers. Here was the perfect setting for progress. An entire profession was faced with a challenge. All its customary tools and techniques were being scrapped either because of expense or inefficacy. Display men had to rise to the occasion, and they were painfully aware of the fact that they badly needed all of the help they could get.

Because the depression had created a great surplus of workers and fewer jobs, many sculptors, artists, woodcarvers, stage designers, etc., turned to the display field for their livelihood or to supplement their dwindling incomes. Plaster and papier maché figures, heads, busts, forms and mannikins were soon being produced for a greedy market. This same period saw the introduction of cork, corrugated paper, glass and plastics for use in the construction of economic props, fixtures, backgrounds and window settings. Stage designers were used to working with such varied materials and knew how to create dramatic settings with them. Color, which had been almost ignored as a display tool, was used with increasing success for dramatic, unifying and thematic purposes. Naturally, with the advent of new materials in the hands of new talent came a change in the face of windows. By constant experiment the new display profession was able to prove that windows were a very important vehicle of sales stimulus.

After much trial and error, they soon discovered that one item or one idea properly dramatized in a window really sold merchandise. With that realization, conglomeration of goods became the horrid examples of how *not* to sell merchandise through window display.

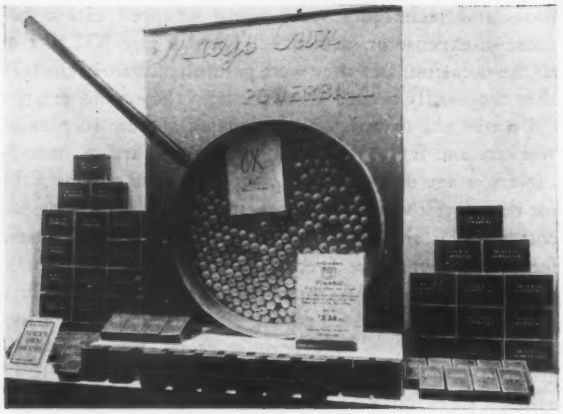
That did not mean that many items in one classification could not be displayed—such as housewares, notions, etc. But they could not be presented indiscriminately. There had to be a unifying theme to the window so that the passerby received one important message as he viewed the display. For example, a housewares window may be built around "Items to make your work easy in the home," "Things women cook with," "Spring housewares sale—everything for

2. Display of merchandise according to the typical practice of a famous department store. Photo R. H. Macy & Co.

2



XUM



3

3. The department store, in dressing windows, uses the techniques of the stage, calling on the skills of artists, lighting experts and merchandisers. Photo R. H. Macy & Co.

the home," etc. In each case, however, the theme of each window is highly simplified and delivers but one over-all message to the customer. This same technique can be applied to ready-to-wear as well. Sometimes the one-idea rule means showing a window full of Sky Blue dresses, even though they may be in different styles. Or the keynote may be strapless evening gowns, with the colors and patterns varying.

Even merchandise which has very few inherent unifying promotional angles—for example, groceries—can be presented in the same mold. At Thanksgiving time when the grocery department warrants a window, the focal point of the display becomes the holiday table, complete with celebrating family. No matter how impossible it may seem on the surface, experienced display men have found that one idea can always be extracted from any group of merchandise to serve as the unifying theme of a window.

To perform all these miracles with merchandise, new types of personnel were added to display-department staffs. Stylists, architects, lighting experts, artists who could paint dramatically realistic backgrounds and murals and a host of other specialists contributed their talents to this new art and science. They even developed techniques of dramatizing the highlighted item in a display with smaller, accessory merchandise. A dress would be featured with handbag, earrings, gloves, hat and shoes serving as the foils. In many cases, stores hired special copywriters to write window and interior-display signs. They recognized the need for provocative, straightforward, informative sign copy that could carry a message even though it was read on the run.

As display techniques were perfected and their value as sales-getters better recognized, interior display first started to come to life. Dramatizing merchandise at the actual point-of-sale was not unheard of, but it was a sadly neglected phase of most every store's promotional activities. The simple, effective techniques that made window displays so successful were easily adapted to show-case and back-case treatments. It was natural for interior displays to be tied in with the windows. The man in charge of interiors would take his cues for props from the window decorators. A customer who saw a sea-horse as the main motif in a sun-and-play-clothes window, would find the same symbol repeated in the departmental displays. Such repetition served to focus the customer's mind on the item the department wished to highlight. Mrs. Consumer was drawn into the store by the window, and guided to the department and to the particular show-case from which the actual merchandise was sold by the interior displays.

Department store package displays

If you recognize the basic principles behind proper display as we know it today, you can readily see why manufacturers turned their attention to the creation of better package designs and more dramatic package displays. They knew their goods would be displayed in windows, showcases, backcases and on the shelves of stores. Those packages that made the most dramatic displays would be sure to catch the display man's eye and be pushed into the foreground. The manufacturer could also feel that he was assuring the success of a window display when he had a well-designed package that would catch the consumer's eye. Because display at the point-of-sale (which is what interior display really is) showed such good results, manufacturers of soft goods even developed package display units. Sheet makers, towel concerns, jewelry houses and hosts of others devised counter-display units that capitalized to the fullest on the attention-getting principles of interior display.

In summary, the few basic principles that should serve as a guide to those in department store display work are easily outlined. The first and most essential of all, whether you speak of windows, interiors, package design, or any of the other types of display, is attention. Unless the display attracts, it will never have a chance to deliver its message. By restricting the display to one idea, one theme, one item of merchandise, one hook to hang your hat on, you can most successfully attain that objective. Secondly, you must gain acceptance of the message by your customer by a simple, forceful message on the window or case sign and the proper use of dramatic props or backgrounds that lend authority, glamour and authenticity to the merchandise itself. As well as getting the customer's attention, any display must partially sell her on the item for sale, or at least cause her to investigate it further.

The alert display department and store will also recognize the institutional overtones inherent in a good display job. Windows and interiors may be essentially salesmen of goods, but in so far as their entertainment value, their ability to evince an appreciation for their artistic excellence on the part of the public and their opportunity to impress the store's customers with a job well done is concerned, this aspect of their functions in any store's promotional program cannot be too strongly emphasized. Windows have created reputations for some New York stores and will continue to do so as long as display men rely on the dramatic as their chief attention-getting tool.

"U-S" KNOW-HOW

AN EXTRA QUALITY IN COLOR REPRODUCTION



"U-S" KNOW-HOW in the handling of color reproduction on displays, posters and other lithographed advertising materials, is a finely balanced combination of creative brains, technical skill and long experience. Put this know-how to work for you if you want the finest results lithography can produce.

THE UNITED STATES PRINTING & LITHOGRAPH COMPANY

HOME OFFICE: 350 BEECH ST., CINCINNATI 12, OHIO—SALES OFFICES IN PRINCIPAL CITIES

U·S·P·L

5 Great "U·S" Plants . . . . STRATEGICALLY LOCATED . . . .

PRODUCING PACKAGING AND LITHOGRAPHED ADVERTISING OF HIGHEST QUALITY



XUM





THE WAR..

and Window Display

●

These days our plant is increasingly occupied with important War business. We are proud thus to be able to contribute to the war effort.

Also we are happy that our normal peacetime business — window display—still continues. On a somewhat modest scale it is true—and in spite of shortages in materials of all kinds.

Illustrated is a reversible display that we have patented. If you need a window display, here is one that conserves vital materials. It gives you two complete displays, but uses only one piece of mountboard and only one packaging (no tricky die cut edges to be broken in transit).

We will gladly send a sample on request.



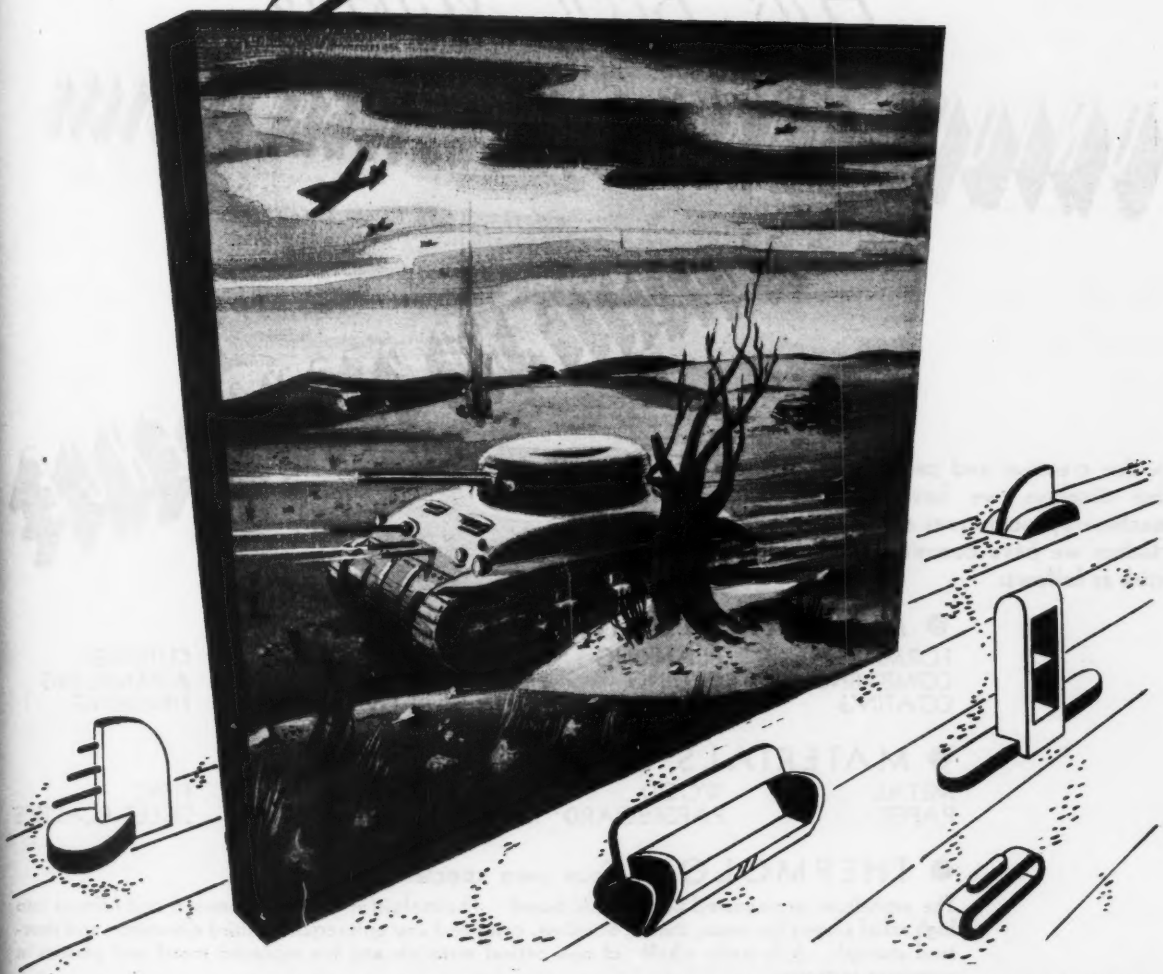
Buy War Bonds

CREATIVE LITHOGRAPHERS

KINDRED, MAC LEAN & CO., Inc.

MEMBER POINT OF PURCHASE ADVERTISING INSTITUTE

Today WAR PRODUCTION



TOMORROW DISTINCTIVE DISPLAYS

The "custom made" metal article you need will receive the close attention of our men who are specialists in every branch of the metal fabricating field—just send us your inquiries.

We are proud of our achievements and workmanship.

ADVERTISING METAL DISPLAY CO.

WAR PRODUCTS DIVISION CHICAGO ILLINOIS

NEW YORK DETROIT MILWAUKEE

For More Than 20 *Years* CHASPEC *Has Been Making*

UNIQUE THREE DIMENSIONAL DISPLAYS OF QUALITY AND PERMANENCE

In the creation and production of these distinctive displays, we have developed specialized machinery, techniques and materials. Since Pearl Harbor we have converted these facilities to war work as follows:

● MANUFACTURING FACILITIES

FORMING	BLANKING	EMBOSSING	CUTTING
COMBINING	GLUING	LAMINATING	ASSEMBLING
COATING	SPRAYING	ENAMELING	FINISHING

● MATERIALS USED

METAL	WOOD	MASONITE	FIBRE
PAPER	PAPERBOARD	COMPOSITION	SHEET PLASTICS

● THERMOLOID *(our own specialty)*

The asphaltum impregnated fibre plastic board. Thermoloid is moulded, pressed and formed into high relief shapes for bases, stands, housings, cases and any unit requiring third dimension and structural strength. It is made wholly of non-critical materials and has replaced metal and plastics in numerous instances.

● TYPICAL PRODUCTS

CABINETS	INSTRUMENT PANELS	RINGS	SPACERS
CABINET PARTS	CUSPIDOR MATS	MOUNTS	STENCILS
SEPARATORS	CARRYING CASE PARTS	BASES	BOXES
TRAY BOTTOMS	BOOK COVERS	WASHERS	BOX COVERS
MOUNT PARTS	INSTRUMENT DIALS	SIGNS	GAMES
INSULATION	INSTRUMENT CASES	PLAQUES	TOYS
RADIO PARTS	SEPARATOR RINGS	DISPLAYS	NOVELTIES
			OIL FILTERS

For years we have been solving difficult display problems. For the duration our wide facilities are at the service of all industries.

Solving difficult manufacturing problems since 1922.

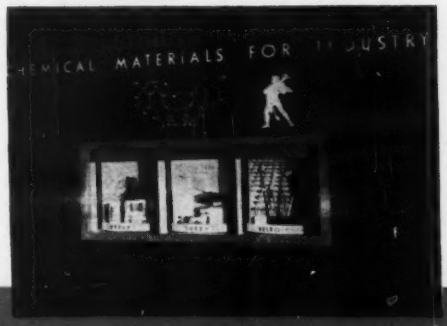
Inquiries solicited for the supply of complete products, parts thereof or finishing only.

CHASPEC MANUFACTURING CO.

295 LAFAYETTE STREET • NEW YORK, N. Y. • CA-6-0338

In War or Peace

THE STANDARD FOR DISPLAYS

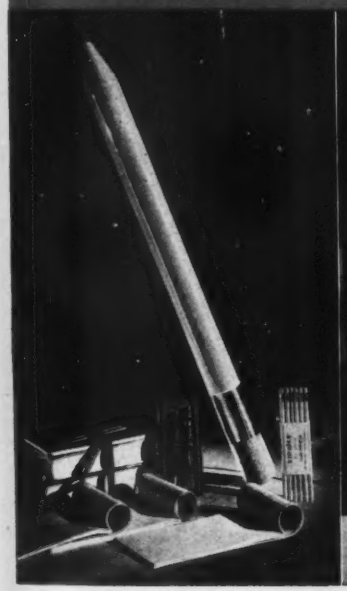


Take a job like permanent or temporary commercial displays and Lumarith is the ideal material. In addition to the natural appeal of transparent sheets, the colorful extruded trim of Lumarith combines display value with light weight.

Lumarith*

a Celanese® Plastic

*Reg. U. S. Pat. Off.



The giant size translucent Lumarith pencil in brilliant color is indicative of what can be done with this light weight plastic.



Lumarith in color will make a stained glass window almost more life-like than the real thing.

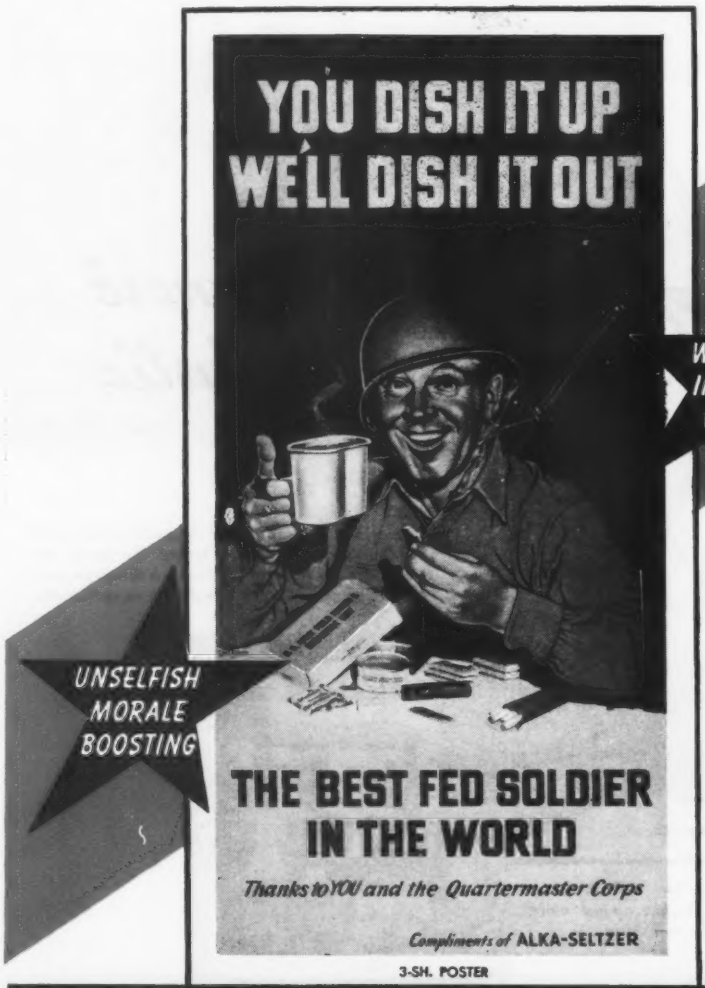
Lumarith as an individual show-case is the good merchandiser's dream. During the war, the same idea has been applied to such things as precision instrument covers and even oxygen tents.



The use of Lumarith plastics in displays will have even more public appeal after the war than before. One reason is that millions of men and women in the armed services have become familiar with Lumarith's beauty and qualities through its many wartime applications. . . . Celanese Celluloid Corporation, *The First Name in Plastics*, a division of Celanese Corporation of America, 180 Madison Avenue, New York City 16.

★ ADVERTISING IS *Fighting*

CONSERVATION — MORALE BUILDING — ESSENTIAL WAR WORK — HEALTH MAINTENANCE — BLOOD DONATION — WAR BONDS . . . these are but a few of the vital activities now being spotlighted and fostered by American advertising. Other essential *duration* and *postwar* action can be inspired by Forbes creative cooperation.



3-SH. POSTER



LIFE-SIZE CUTOUT

FORBES THE SHOP BY THE SEA **LITHOGRAPH CO.**

P. O. BOX 513 · BOSTON 2

NEW YORK CHICAGO CLEVELAND ROCHESTER



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BUYERS' DIRECTORY

MATERIALS AND SUPPLIES SECTION

ADHESIVES*

American Products Mfg. Co., New Orleans, La.
Arabol Mfg. Co., New York, N. Y.
Arvey Corp., Chicago, Ill., & Jersey City, N. J.
Atlas Powder Co., Zapon Div., Stamford, Conn., & North Chicago, Ill.
Bingham Bros., New York, N. Y.
Clark Stek-O Corp., Rochester, N. Y.
Commercial Paste Co., The, Columbus, Ohio
Dewey & Almy Chemical Co., Cambridge, Mass.
Dispersions Process, Inc., New York, N. Y.
Du Pont de Nemours, E. I. & Co., Inc., Wilmington, Del.
Findley, F. G. Co., The, Milwaukee, Wis.
Goodyear Tire & Rubber Co., Akron, Ohio
International Printing Ink, Div. Interchemical Corp., New York, N. Y.
Manhattan Paste & Glue Co., Inc., Bklyn, N. Y.
Marks Chemical Works, New York, N. Y.
Minnesota Mining & Mfg. Co., St. Paul, Minn.
National Adhesives, Div. National Starch Products, Inc., New York, N. Y.
Naugatuck Chemical, Div. U. S. Rubber Co., New York, N. Y.
Paisley Products, Inc., Chicago, Ill.
Philadelphia Quartz Co., Philadelphia, Pa.
Stein, Hall Mfg. Co., Chicago, Ill.
Sylvania Industrial Corp., New York, N. Y.
Union Paste Co., Hyde Park, Mass.
U. S. Adhesives Co., Chicago, Ill.
United States Rubber Co., New York, N. Y.
Williamson Adhesives, Inc., Chicago, Ill.

ADHESIVES, RESIN*

American Cyanamid Co., Plastics Div., New York, N. Y.
Atlas Powder, Zapon Div., Stamford, Conn., & North Chicago, Ill.
Bakelite Corp., New York, N. Y.
Catalin Corp., New York, N. Y.
Dewey & Almy Chemical Co., Cambridge, Mass.
Du Pont de Nemours, E. I. & Co., Inc., Wilmington, Del.
Durez Plastics & Chemicals, Inc., North Tonawanda, N. Y.
Glyco Products Co., Inc., Bklyn, N. Y.
Hercules Powder Co., Inc., Wilmington, Del.
Makalot Corp., Boston, Mass.
Monsanto Chemical Co., Plastics Div., Springfield, Mass.
Plaskon Div., Libbey-Owens-Ford Glass Co., Toledo, Ohio

*Formulations for adhesives are individually developed for very specific end uses. This is particularly true of the newer resin adhesives. The user should consult the article, "What to Tell Your Adhesives Supplier," in PACKAGING CATALOG, and give full information as to requirements and conditions of use.

BAG TIES

Acme Steel Co., Chicago, Ill.
American-Natl. Bag & Burlap Co., Inc., Bklyn, N. Y.
Bethlehem Steel Co., Bethlehem, Pa.
Betner, Benj. C. Co., Devon, Pa.
Equitable Paper Bag Co., Inc., Long Island City, N. Y.
Paramount Paper Products Co., Inc., Phila., Pa.
Royal, Thomas M. & Co., Phila., Pa.
St. Regis Paper Co., New York, N. Y.

BOX BOARD, ASPHALT LINED

Butterfield-Barry Co., New York, N. Y.
Consolidated Paper Co., Monroe, Mich.
Empire Box Corp., Garfield, N. J.
Fibreboard Products, Inc., San Francisco, Calif.
Gair, Robert Co., Inc., New York, N. Y.
Gardner-Richardson Co., The, Middletown, Ohio
Jaypaco Co., New York, N. Y.
Lowe Paper Co., Ridgefield, N. J.
Morris Paper Mills, Chicago, Ill.
National Water-Proofing Co., Camden, N. J.
Ohio Boxboard Co., The, Wadsworth, Ohio
Rexford Paper Co., Milwaukee, Wis.
Salwen, Joe Paper Co., New York, N. Y.
Waldorf Paper Products Co., St. Paul, Minn.

BOX BOARD, CLAY-COATED

American Coating Mills, Inc., Elkhart, Ind.
Bradner Smith & Co., Chicago, Ill.
Butterfield-Barry Co., New York, N. Y.
Champion Paper & Fibre Co., The, Hamilton, Ohio
Container Corp. of America, Chicago, Ill.
Eddy Paper Corp., Chicago, Ill.
Gardner-Richardson Co., The, Middletown, Ohio
Jaypaco Co., New York, N. Y.
Lowe Paper Co., Ridgefield, N. J.
National Folding Box Co., New Haven, Conn.
Salwen, Joe Paper Co., New York, N. Y.

BOX BOARD, FOLDING & SET-UP

Albia Box & Paper Co., Troy, N. Y.
Alton Box Board Co., Alton, Ill.
American Box Board Co., Grand Rapids, Mich.
American Coating Mills, Inc., Elkhart, Ind.
Andrews, O. B. Co., Chattanooga, Tenn.
Bird & Son, Inc., East Walpole, Mass.
Butterfield-Barry Co., New York, N. Y.
Carolina Paper Board Corp., Charlotte, N. C.
Carthage Paper Makers, Inc., Carthage, N. Y.
Central Fibre Products Co., Chicago, Ill.
Chemical Paper Mfg. Co., Holyoke, Mass.
Chesapeake Paperboard Co., The, Baltimore, Md.
Columbia Box Board Mills, Inc., Chatham, N. Y.
Consolidated Paper Co., Monroe, Mich.
Container Corp. of America, Chicago, Ill.
Continental Paper Co., Ridgefield Park, N. J.
Cornell Wood Products Co., Chicago, Ill.
Clifton Paper Board Co., Clifton, N. J.
Eddy Paper Corp., The, Chicago, Ill.
Empire Box Corp., Garfield, N. J.
Federal Paper Board Co., Inc., Bogota, N. J.
Fibreboard Products, Inc., San Francisco, Calif.
Fleming & Son, Inc., Dallas, Tex.
Fort Orange Paper Co., Castleton-on-Hudson, N. Y.
Franklin Board & Paper Co., The, Franklin, Ohio
Gair, Robert Co., Inc., New York, N. Y.
Gardner-Richardson Co., The, Middletown, Ohio
Hummel & Downing Co., Milwaukee, Wis.
Hummel-Ross Fibre Corp., Hopewell, Va.
Inland Container Corp., Indianapolis, Ind.
Jaypaco Co., New York, N. Y.
Lawless Bros. Paper Mills, Inc., E. Rochester, N. Y.
Liberty Paperboard Co., The, Steubenville, Ohio
Lowe Paper Co., Ridgefield, N. J.
Mac Andrews & Forbes Co., Camden, N. J.
Mac Sim Bar Paper Co., Otsego, Mich.
Manchester Board & Paper Co., Inc., Richmond, Va.
McEwan Bros., Inc., Whippany, N. J.
Menasha Products Co., The, Div. Marathon Paper Mills, Menasha, Wis.
Michigan Carton Co., Battle Creek, Mich.
Mobile Paper Mill Co., Mobile, Ala.
Morris Paper Mills, Chicago, Ill.
Natick Box & Board Co., Natick, Mass.
National Folding Box Co., New Haven, Conn.
Nelson, B. F. Mfg. Co., Minneapolis, Minn.
New Haven Pulp & Board Co., New Haven, Conn.
Newark Boxboard Co., Newark, N. J.
Ohio Boxboard Co., The, Wadsworth, Ohio
Ontonagon Fibre Corp., Ontonagon, Mich.
Queen City Paper Co., The, Akron, Ohio
Robertson Paper Box Co., Montville, Conn.
Salwen, Joe Paper Co., New York, N. Y.
Schmidt & Ault Paper Co., York, Pa.
Smeallie & Voorhees, Inc., Amsterdam, N. Y.
Sonoco Products Co., Garwood, N. J.
Southern Kraft Div., International Paper Co., New York, N. Y.
Strange, John Paper Co., Menasha, Wis.
Sutherland Paper Co., Kalamazoo, Mich.
Tennessee Paper Mills, Chattanooga, Tenn.
Toronto Paper Mfg. Co., Toronto, Ohio.
United Paperboard Co., New York, N. Y.
Waldorf Paper Products Co., St. Paul, Minn.

BOX BOARD, METALLIC-COATED

American Coating Mills, Inc., Elkhart, Ind.
Bradner Smith & Co., Chicago, Ill.
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Champion Paper & Fibre Co., The, Hamilton, Ohio
Dennison Mfg. Co., Framingham, Mass.
Jaypaco Co., New York, N. Y.
Keller-Dorian Corp., New York, N. Y.
Lowe Paper Co., Ridgefield, N. J.
Matthias Paper Corp., Phila., Pa.
McLaurin-Jones Co., Brookfield, Mass.
Miller Paper Co., New York, N. Y.
Salwen, Joe Paper Co., New York, N. Y.

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American Coating Mills, Inc., Elkhart, Ind.
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Container Corp. of America, Chicago, Ill.
Gair, Robert Co., Inc., New York, N. Y.
Gardner-Richardson Co., The, Middletown, Ohio
Inland Container Corp., Indianapolis, Ind.
Lebanon Paper Box Co., Lebanon, Pa.
Lowe Paper Co., Ridgefield, N. J.
Menasha Products Co., The, Div. Marathon Paper Mills, Menasha, Wis.
Michigan Carton Co., Battle Creek, Mich.

Morris Paper Mills, Chicago, Ill.
National Folding Box Co., New Haven, Conn.
National Water-Proofing Co., Camden, N. J.
Ohio Boxboard Co., The, Wadsworth, Ohio
Salwen, Joe Paper Co., New York, N. Y.
Waldorf Paper Products Co., St. Paul, Minn.

BRUSHES, MARKING & STENCILLING

Diagraph-Bradley Stencil Machine Corp., St. Louis, Mo.
Floquil Products, Inc., New York, N. Y.
Force, Wm. A. & Co., Inc., Bklyn, N. Y.

CAN SEALING COMPOUNDS

Ams, Max Machine Co., The, Bridgeport, Conn.
Dewey & Almy Chemical Co., Cambridge, Mass.
Firestone Rubber & Latex Products Co., Fall River, Mass.
International Printing Ink, Div. Interchemical Corp., New York, N. Y.
Union Carbide & Carbon Corp., New York, N. Y.

CLOSURE LINERS

Aluminum Co. of America, Pittsburgh, Pa.
Anchor Hocking Glass Corp., Lancaster, Ohio
Armstrong Cork Co., Lancaster, Pa.
Bernardin Bottle Cap Co., Inc., Evansville, Ind.
Bond Mfg. Corp., Inc., Wilmington, Del.
Carbide & Carbon Chemicals Corp., Plastics Div., New York, N. Y.
Columbia Specialty Co., Inc., Baltimore, Md.
Dewey & Almy Chemical Co., Cambridge, Mass.
Du Pont de Nemours, E. I. & Co., Inc., Wilmington, Del.
Dobeckmun Co., The, Cleveland, Ohio
General Felt Products, Inc., Bklyn, N. Y.
Gutmann, Ferdinand & Co., Bklyn, N. Y.
Johnston Tin Foil & Metal Co., The, St. Louis, Mo.
Mundet Cork Corp. (Closure Div.), Bklyn, N. Y.
Pollock Paper & Box Co., Dallas, Tex.
Traver Corp., Chicago, Ill.
Union Carbide & Carbon Corp., New York, N. Y.
United States Rubber Co., New York, N. Y.

CLOSURE SEALING COMPOUNDS

Dewey & Almy Chemical Co., Cambridge, Mass.
Dispersions Process, Inc., New York, N. Y.
International Printing Ink, Div. Interchemical Corp., New York, N. Y.
Naugatuck Chemical Div. of U. S. Rubber Co., New York, N. Y.
Paisley Products, Inc., Chicago, Ill.
Pyroxylin Products, Inc., Chicago, Ill.

CLOSURES, APPLICATOR
(Glass, Rod, Brush, Dropper, Swab)

Anchor Hocking Glass Corp., Lancaster, Ohio
Armstrong Cork Co., Lancaster, Pa.
Brockway Glass Co., Inc., Brockway, Pa.
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.
Consolidated Fruit Jar Co., New Brunswick, N. J.
Double Duty Products, Inc., Cleveland, Ohio
Glass Industries, Inc., New York, N. Y.
Grigoleit Co., The, Decatur, Ill.
Kimble Glass Co., Vineland, N. J.
Mundet Cork Corp. (Closure Div.), Bklyn, N. Y.
Owens-Illinois Glass Co., Toledo, Ohio
Owens-Illinois Pacific Coast Co., San Francisco, Calif.
Pennsylvania Glass Products Co., Pittsburgh, Pa.
Super-Seal Container Corp., Washington, D. C.
Terkelsen Machine Co., Boston, Mass.
Warren Plastics Corp., Warren, Pa.
Wirz, A. H. Inc., Chester, Pa.

CLOSURES, ATOMIZER & SPRAY

Double Duty Products, Inc., Cleveland, Ohio
Glass Industries, Inc., New York, N. Y.
Federal Tool Co., Chicago, Ill.

CLOSURES, BAG
(Thermo-Plastic)

Betner, Benj. C. Co., Devon, Pa.
Dispersions Process, Inc., New York, N. Y.
Dobeckmun Co., The, Cleveland, Ohio
Du Pont de Nemours, E. I. & Co., Inc., Wilmington, Del.
Interstate Folding Box Co., Middletown, Ohio
Paramount Paper Products Co., Phila., Pa.
Royal, Thomas M. & Co., Phila., Pa.

CLOSURES, CERAMIC

General Felt Products, Inc., Bklyn, N. Y.
Vanderlaan Tile Co., New York, N. Y.

CLOSURES, CROWN

Armstrong Cork Co., Lancaster, Pa.
Bernardin Bottle Cap Co., Inc., Evansville, Ind.
Bond Mfg. Corp., Inc., Wilmington, Del.
Continental Can Co., Inc., New York, N. Y.
Crown Cork & Seal Co., Baltimore, Md.
Gutmann, Ferdinand & Co., Bklyn, N. Y.
Mundet Cork Corp. (Closure Division), Bklyn, N. Y.

CLOSURES, GLASS

Aluminum Container Corp., Fulton, N. Y.
Anchor Hocking Glass Corp., Lancaster, Ohio
Armstrong Cork Co., Lancaster, Pa.
Brockway Glass Co., Inc., Brockway, Pa.
Carr-Lowrey Glass Co., Baltimore, Md.
Glass Industries, Inc., New York, N. Y.
Hazel-Atlas Glass Co., Wheeling, W. Va.
Kimble Glass Co., Vineland, N. J.
Owens-Illinois Glass Co., Toledo, Ohio
Swindell Bros., Baltimore, Md.

CLOSURES, METAL

Acme Steel Co., Chicago, Ill.
Advanced Closures Corp., Bklyn, N. Y.
Ajax Bottle Cap Corp., Bklyn, N. Y.
Aluminum Company of America, Pittsburgh, Pa.
Aluminum Container Corp., Fulton, N. Y.
Aluminum Goods Mfg. Co., Manitowoc, Wis.
Aluminum Seal Co., New Kensington, Pa.
American Star Cork Co., Inc., Bklyn, N. Y.
Anchor Hocking Glass Corp., Lancaster, Ohio
Aridor Company, The, Chicago, Ill.
Armstrong Cork Co., Lancaster, Pa.
Bernardin Bottle Cap Co., Inc., Evansville, Ind.
Bond Mfg. Corp., Inc., Wilmington, Del.
Brass Goods Mfg. Corp., Bklyn, N. Y.
Braun, W. Co., Chicago, Ill.
Bridgeport Metal Goods Mfg. Co., Bridgeport, Conn.
Cans, Inc., Chicago, Ill.
Carvin Bottle Cap Corp., Bklyn, N. Y.
Clark, J. L. Mfg. Co., Rockford, Ill.
Columbia Specialty Co., Inc., Baltimore, Md.
Crown Cork & Seal Co., Baltimore, Md.
Eastern Cap & Closure Corp., Baltimore, Md.
Ellis, George D., & Sons, Inc., Phila., Pa.
Empire Metal Cap Co., Inc., Bklyn, N. Y.
Fabart Instrument Co., Chicago, Ill.
Federal Tool Corp., Chicago, Ill.
General Can Co., Chicago, Ill.
Guardian Safety Seal Co., Chicago, Ill.
Gutmann, Ferdinand & Co., Bklyn, N. Y.
Hazel-Atlas Glass Co., Wheeling, W. Va.
Henlopen Mfg. Co., Lewes, Del.
Keystone Cap Co., Columbia, Pa.
Mundet Cork Corp. (Closure Div.), Bklyn, N. Y.
National Can Corp., New York, N. Y.
National Seal Corp., Bklyn, N. Y.
Owens-Illinois Glass Co., Toledo, Ohio
Phoenix Metal Cap Co., Chicago, Ill.
Prescott, J. L. Co., Passaic, N. J.
Scovill Mfg. Co., Waterbury, Conn.
Sterling Seal Co., Erie, Pa.
Swan Metal Cap Co., Inc., Chicago, Ill.
Trio Metal Cap Co., Chicago, Ill.
Upressit Products Corp., New York, N. Y.
Western Stopper Co., Inc., San Francisco, Calif.
West Penn Mfg. & Supply Corp., Brackenridge, Pa.
White Cap Co., Chicago, Ill.
Williams Sealing Corp., Decatur, Ill.
Wirz, A. H. Inc., Chester, Pa.

CLOSURES, METAL
(Tamper-Proof)

Acme Steel Co., Chicago, Ill.
Aluminum Co. of America, Pittsburgh, Pa.
Aluminum Seal Co., New Kensington, Pa.
Anchor Hocking Glass Corp., Lancaster, Ohio
Canister Co., The, Phillipsburg, N. J.
Crown Can Co., Phila., Pa.
Guardian Safety Seal Co., Chicago, Ill.
Gutmann, Ferdinand & Co., Bklyn, N. Y.
Na-Mac Products Corp., Hollywood, Calif.
National Seal Corp., Bklyn, N. Y.
Owens-Illinois Glass Co., Toledo, Ohio
Williams Sealing Corp., Decatur, Ill.

CLOSURES, MOLDED PLASTIC

American Molding Co., San Francisco, Calif.
Anchor Hocking Glass Corp., Lancaster, Ohio
Armstrong Cork Co., Lancaster, Pa.
Auburn Button Works, Inc., Auburn, N. Y.
Boonton Molding Co., Boonton, N. J.
Braun, W. Co., Chicago, Ill.
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.
Davies, Harry Molding Co., Chicago, Ill.
Dodge Cork Co., Lancaster, Pa.
Drell Novelty Mfg. Co., The, New York, N. Y.
Eclipse Moulded Products Co., Milwaukee, Wis.
Federal Tool Corp., Chicago, Ill.
General Electric Co., Plastics Dept., Pittsfield, Mass.
Great American Plastics Co., Leominster, Mass.
Grigoleit Co., The, Decatur, Ill.
Kurz-Kasch, Inc., Dayton, Ohio
Mack Molding Co., Wayne, N. J.
Michigan Molded Plastics, Inc., Dexter, Mich.
Molded Insulation Co., Phila., Pa.
Mundet Cork Corp. (Closure Div.), Bklyn, N. Y.
Northern Industrial Chem. Co., South Boston, Mass.
Owens-Illinois Glass Co., Toledo, Ohio
Owens-Illinois Pacific Coast Co., San Francisco, Calif.
Paragon Plastics, Inc., Seattle, Wash.
Pennsylvania Glass Products Co., Pittsburgh, Pa.

Addresses of companies listed appear on pages 755–763

XUM

Phoenix Metal Cap Co., Chicago, Ill.
Pittsburgh Plastics Co., Inc., New Kensington, Pa.
Plastic & Die Cast Prod. Corp., Los Angeles, Calif.
Plastic Engineering, Inc., Cleveland, Ohio
Plastics, Inc., Bradley Beach, N. J.
Rathbun Molding Corp., Salamanca, N. Y.
Sillocks-Miller Co., The, So. Orange, N. J.
Standard Molding Co., Baltimore, Md.
Sterling Injection Molding, Inc., Buffalo, N. Y.
Sterling Plastics Co., Union, N. J.
Tech-Art Plastics Co., Long Island City, N. Y.
Terkelsen Machine Co., Boston, Mass.
Victor Metal Products Corp., Bklyn, N. Y.
Warren Plastics Corp., Warren, Pa.
Waterbury Companies, Inc., Waterbury, Conn.
Watertown Mfg. Co., Watertown, Conn.
Wheeling Stamping Co., Wheeling, W. Va.
Williams Sealing Corp., Decatur, Ill.
Windman Bros., Los Angeles, Calif.
Wirz, A. H., Inc., Chester, Pa.
Worcester Moulded Plastics Co., Worcester, Mass.

CLOSURES, PAPER

American Seal-Kap Co., Long Island City, N. Y.
Burt, F. N. Co., Inc., Buffalo, N. Y.
Gates Paper Co., Ltd., Los Angeles, Calif.
General Felt Products, Inc., Bklyn, N. Y.
Guardian Safety Seal Co., Chicago, Ill.
National Seal Corp., Bklyn, N. Y.
Niemand Bros., Inc., Long Island City, N. Y.
Owens-Illinois Glass Co., Toledo, Ohio
Randolph Paper Box Co., The, Richmond, Va.
Sealright Co., Inc., Fulton, N. Y.
Waterbury Paper Box Co., The, Waterbury, Conn.

CLOSURES, SECONDARY

(Foil)

Aluminum Seal Co., New Kensington, Pa.
Armstrong Cork Co., Lancaster, Pa.
Gutmann Ferdinand & Co., Bklyn, N. Y.
Johnston Tin Foil & Metal Co., The, St. Louis, Mo.
Reynolds Metals Co., Richmond, Va.

(Viscose)

Armstrong Cork Co., Lancaster, Pa.
Celon Co., The Madison, Wis.
Du Pont de Nemours, E. I. & Co., Inc., Wilmington, Del.
Gutmann, Ferdinand & Co., Bklyn, N. Y.
Sylvania Industrial Corp., New York, N. Y.

CLOSURES, FOR VACUUM SEALING

Aluminum Co. of America, Pittsburgh, Pa.
Aluminum Seal Co., New Kensington, Pa.
Anchor Hocking Glass Corp., Lancaster, Ohio
Aridor Co., The, Chicago, Ill.
Bernardin Bottle Cap Co., Inc., Evansville, Ind.
Crown Cork & Seal Co., Baltimore, Md.
Dewey & Almy Chemical Co., Cambridge, Mass.
Guardian Safety Seal Co., Chicago, Ill.
Gutmann, Ferdinand & Co., Bklyn, N. Y.
Hazel-Atlas Glass Co., Wheeling, W. Va.
National Seal Corp., Bklyn, N. Y.
Owens-Illinois Glass Co., Toledo, Ohio
Phoenix Metal Cap Co., Chicago, Ill.
Super-Seal Container Corp., Washington, D. C.
White Cap Co., Chicago, Ill.
Williams Sealing Corp., Decatur, Ill.

CLOSURES, WOOD

American Star Cork Co., Inc., Bklyn, N. Y.
Amdeco, New York, N. Y.
Gibson Jones Co., New York, N. Y.
Paragon Wood Turning Co., Inc., New York, N. Y.
Schutze Bros., New York, N. Y.

COATINGS, PROTECTIVE

American Printing Ink Co., Div. General Printing Ink Corp., Chicago, Ill.
American Products Mfg. Co., New Orleans, La.
Atlas Powder Co., Zapon Div., Stamford, Conn., and North Chicago, Ill.
Ault & Wiborg Corp., Div. Interchemical Corp., New York, N. Y.
Bakelite Corp., New York, N. Y.
California Ink Co., Inc., The, San Francisco, Calif.
Carbide & Carbon Chemical Corp., Plastics Div., New York, N. Y.
Catalin Corp., New York, N. Y.
Chemical Color & Supply Co., Div. General Printing Ink Corp., Chicago, Ill.
Clover Leaf Paint & Varnish Corp., Long Island City, N. Y.
Corn Products Refining Co., New York, N. Y.
Crescent Ink & Color Co. of Penn., Phila., Pa.
Davison Chemical Corp., The, Baltimore, Md.
Dewey & Almy Chemical Corp., Cambridge, Mass.
Dispersions Process, Inc., New York, N. Y.
Dow Chemical Co., The, Midland, Mich.
Du Pont de Nemours, E. I. & Co., Inc., Wilmington, Del.
Durez Plastics & Chemicals, Inc., No. Tonawanda, N. Y.
Eagle Printing Ink Co., Div. General Printing Ink Corp., New York, N. Y.
Egyptian Lacquer Mfg. Co., The, New York, N. Y.
Fales Chemical Co., Inc., The, Cornwall Landing, N. Y.
Flint, Howard Ink Co., Detroit, Mich.
Floquil Products, Inc., New York, N. Y.
Fuchs & Lang Mfg. Co., The, Div. General Printing Ink Corp., New York, N. Y.
General Industrial Finishes, Div. General Printing Ink Corp., New York, N. Y.
General Printing Ink Corp., New York, N. Y.
Goodrich, B. F. Co., The, Akron, Ohio
Goodyear Tire & Rubber Co., Akron, Ohio
Gordon-Lacey Chemical Products Co., Maspeth, L. I., N. Y.
Heresite & Chemical Co., Manitowoc, Wis.
Huber, J. M. Inc., New York, N. Y.
International Printing Ink, Div. Interchemical Corp., New York, N. Y.
Interstate Folding Box Co., Middletown, Ohio
Lauxite Corp., Lockport, N. Y.
Levey, Fred'k H. Co. Inc., New York, N. Y.
Maas & Waldstein Co., Newark, N. J.
Makalot Corp., Boston, Mass.
McCoy Paper Converters, Phila., Pa.
Monsanto Chemical Co., Plastics Div., Springfield, Mass.
Morrill, Geo. H. Co., Div. General Printing Ink Corp., New York, N. Y.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
National Adhesives Div. of National Starch Products, Inc., New York, N. Y.
National Oil Products Co., Harrison, N. J.
National Waterproofing Co., Camden, N. J.
Naugatuck Chemical, Div. of U. S. Rubber Co., New York, N. Y.
Paisley Products, Inc., Chicago, Ill.
Paragon Plastics, Inc., Seattle, Wash.
Philadelphia Quartz Co., Phila., Pa.
Plastic Coating Corp., Holyoke, Mass.
Plastics Finishing Corp., Bklyn, N. Y.
Pope & Gray, Inc., New York, N. Y.
Protective Coatings, Inc., Detroit, Mich.
Pyrotex Leather Co., Leominster, Mass.
Pyroxylin Products, Inc., Chicago, Ill.
Reilly Tar & Chemical Corp., Indianapolis Ind.
Roberts, Lewis Inc., Newark, N. J.
Roosen, H. D. Co., Bklyn, N. Y.
Seal, Inc., Shelton, Conn.
Sinclair & Valentine Co., New York, N. Y.
Ullman, Sigmund Co., Div. General Printing Ink Corp., New York, N. Y.
Union Carbide & Carbon Corp., New York, N. Y.
United Mfg. Co., Springfield, Mass.
U. S. Finishing & Mfg. Co., Chicago, Ill.
United States Rubber Co., New York, N. Y.

CORD, CELLULOSE

Blake, Moffitt & Towne, San Francisco, Calif.
Dennison Mfg. Co., Framingham, Mass.
Fibre Cord Co., New York, N. Y.
Sylvania Industrial Corp., New York, N. Y.

CORK SHEETS

(Paper-Backed)

Bond Mfg. Corp., Inc., Wilmington, Del.
Mundet Cork Corp. (Closure Div.), Bklyn, N. Y.

CORKS

American Star Cork Co., Inc., Bklyn, N. Y.
Armstrong Cork Co., Lancaster, Pa.
Dodge Cork Co., Inc., Lancaster, Pa.
Mundet Cork Corp. (Closure Div.), Bklyn, N. Y.

CORKS, ALUMINUM TOP

Armstrong Cork Co., Lancaster, Pa.
Consolidated Fruit Jar Co., New Brunswick, N. J.
Dodge Cork Co., Inc., Lancaster, Pa.
Mundet Cork Corp. (Closure Div.), Bklyn, N. Y.

CORKS, MOLDED TOP

Armstrong Cork Co., Lancaster, Pa.
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.
Compo-Site Plastics Div., Lowe, E. S. Co., Inc., Paterson, N. J.
Dodge Cork Co., Inc., Lancaster, Pa.
Mack Molding Co., Wayne, N. J.
Michigan Molded Plastics, Inc., Dexter, Mich.
Molded Insulation Co., Phila., Pa.
Mundet Cork Corp. (Closure Div.), Bklyn, N. Y.

CORKS, WOOD TOP

American Star Cork Co., Inc., Bklyn, N. Y.
Armstrong Cork Co., Lancaster, Pa.
Dodge Cork Co., Inc., Lancaster, Pa.
Mundet Cork Corp. (Closure Div.), Bklyn, N. Y.

DECALCOMANIA TRANSFERS

American Decalcomania Co., Chicago, Ill.
Bender, H. P., New York, N. Y.
Dennison Mfg. Co., Framingham, Mass.
Dobeckmun Co., The, Cleveland, Ohio
Foxon Co., The, Providence, R. I.
Howell, F. M. & Co., Elmira, N. Y.
Kaumagraph Co., Wilmington, Del.
McLaurin-Jones Co., Brookfield, Mass.
Meyercord Co., The, Chicago, Ill.
Palm Bros. Decalomania Co., The, Cincinnati, Ohio
Palm, Fechteler & Co., New York, N. Y.
Process Displays, Inc., Milwaukee, Wis.
Stecher-Traung Lithograph Corp., Rochester, N. Y.
Universal Ceramics, New York, N. Y.

DROPPERS, BOTTLE

Anchor Hocking Glass Corp., Lancaster, Ohio
Armstrong Cork Co., Lancaster, Pa.
Brockway Glass Co., Inc., Brockway, Pa.
Double Duty Products, Inc., Cleveland, Ohio
Glass Industries, Inc., New York, N. Y.
Kimble Glass Co., Vineland, N. J.
Mack Molding Co., Wayne, N. J.
Owens-Illinois Glass Co., Toledo, Ohio
Pennsylvania Glass Products Co., Pittsburgh, Pa.
Price, M. B. Associates, New York, N. Y.

EXCELSIOR, PAPER

See also Paper, Excelsior and Shredded

American Excelsior Corp., Chicago, Ill.
Ben Mont Papers, Inc., Bennington, Vt.
Crystal Tissue Co., Middletown, Ohio
Erving Paper Mills, Erving, Mass.
Excelsior Paper Specialties Co., New York, N. Y.
Inland Container Corp., Indianapolis, Ind.
Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Newark Paraffine & Parchment Paper Co., Newark, N. J.
Specialty Papers Co., Dayton, Ohio
Sweetnam, Geo. H. Inc., Cambridge, Mass.
Sylvania Industrial Corp., New York, N. Y.
Traver Corp., Chicago, Ill.

FILTERS

Kiefer, Karl Machine Co., Cincinnati, Ohio
Scientific Filter Co., New York, N. Y.

FOIL, METAL

Aluminum Co. of America, Pittsburgh, Pa.
Johnston Tin Foil & Metal Co., The, St. Louis, Mo.
Keller-Dorian Corp., New York, N. Y.
Reynolds Metals Co., Inc., Richmond, Va.

GLASS, ROD & TUBING

Corning Glass Works, Corning, N. Y.
Glass Industries, Inc., New York, N. Y.
Kimble Glass Co., Vineland, N. J.
Pennsylvania Glass Products Co., Pittsburgh, Pa.

INKS, LETTERPRESS & LITHOGRAPHIC

Acme Printing Ink Co., Chicago, Ill.
American Printing Ink Co., Div. General Printing Ink Corp., Chicago, Ill.
Auld, Hampton Inc., Newark, N. J.
Barta-Griffin Co., Worcester, Mass.
Bensing Bros. & Deeney, Phila., Pa.
Braden-Sutphin Ink Co., The, Cleveland, Ohio
California Ink Co., Inc., The, San Francisco, Calif.
Capitol Printing Ink Co., Inc., Washington, D. C.
Carlson, John P. Inc., Bklyn, N. Y.
Chemical Color & Supply Co., Div. General Printing Ink Corp., Chicago, Ill.
Crescent Ink & Color Co. of Penn., Phila., Pa.
Driscoll, Martin & Co., Chicago, Ill.
Eagle Printing Ink Co., Div. General Printing Ink Corp., New York, N. Y.
Flint, Howard Ink Co., Detroit, Mich.
Fuchs & Lang Mfg. Co., The, Div. General Printing Ink Corp., New York, N. Y.
Gaetjens, Berger & Wirth, Inc., Bklyn, N. Y.
General Printing Ink Corp., New York, N. Y.
Grady & Neary Co., Chicago, Ill.
Hellmuth, Charles Printing Ink Corp., New York, N. Y.
Hill-Hentschel Co., St. Louis, Mo.
Hilton-Davis Co., Cincinnati, Ohio
Huber, J. M. Inc., New York, N. Y.
International Printing Ink, Div. Interchemical Corp., New York, N. Y.
Johnson, Chas. Eneu & Co., Phila., Pa.
Kelly, E. J. Co., Kalamazoo, Mich.
Kohn & Madden Printing Ink Co., Chicago, Ill.
Levey, Fred'k H. Co., New York, N. Y.
Manufacturers Printing Ink Corp., Bklyn, N. Y.
Morrill, Geo. H. Co., Div. General Printing Ink Corp., New York, N. Y.
Pacific Printing Ink Co., San Francisco, Calif.
Pope & Gray, Inc., New York, N. Y.
Roberts, Lewis Inc., Newark, N. J.
Roosen, H. D., Co., Bklyn, N. Y.
Schwarm & Jacobus Co., Cincinnati, Ohio
Siebold, J. H. & G. B. Inc., New York, N. Y.
Sinclair & Carroll Co., New York, N. Y.
Sinclair & Valentine Co., New York, N. Y.
Sleight Metallic Ink Co., Phila., Pa.
Sleight Metallic Ink Co. of Ill., Chicago, Ill.
Superior Printing Ink Co., Inc., New York, N Y.
Triangle Ink & Color Co., Inc., Bklyn, N. Y.
Ullman, Sigmund Co., Div. General Printing Ink Corp., New York, N. Y.
Wilson, W. D. Printing Ink Co., Long Island City, N. Y.

INKS, MARKING & STENCIL

Bensing Bros. & Deeney, Phila., Pa.
Braden Sutphin Ink Co., The, Cleveland, Ohio
California Ink Co., Inc., The, San Francisco, Calif.
Diagraph-Bradley Stencil Machine Corp., St. Louis, Mo.
Flint, Howard Ink Co., Detroit, Mich.
Floquil Products, Inc., New York, N. Y.
Force, Wm. A. & Co., Inc., Bklyn, N. Y.
International Printing Ink, Div. Interchemical Corp., New York, N. Y.
Kaumagraph Co., Wilmington, Del.
Kelly, E. J. Co., Kalamazoo, Mich.
Markem Machine Co., Keene, N. H.
Roosen, H. D. Co., Bklyn, N. Y.
Schwarm and Jacobus Co., The, Cincinnati, Ohio
Sinclair & Valentine Co., New York, N. Y.

LABELS, FOIL

American Colortype Co., Chicago, Ill.
Andersen, A. J., Chicago, Ill.
Attleboro Printing & Embossing Co., Inc., Attleboro, Mass.
Bartlett Label Co., Kalamazoo, Mich.
Cameo Die & Label Co., New York, N. Y.
Craftsman Label Co., New York, N. Y.
Dennison Mfg. Co., Framingham, Mass.
Ever Ready Label Corp., New York, N. Y.
Fleming-Potter Co., Peoria, Ill.
Foxon Co., The, Providence, R. I.
Grammes, L. F. & Sons, Inc., Allentown, Pa.
Grand Rapids Label Co., Grand Rapids, Mich.
Johnston Tin Foil & Metal Co., The, St. Louis, Mo.
Kaumagraph Co., Wilmington, Del.
Krause, Richard M. Inc., New York, N. Y.
Lambooy Label & Wrapper Co., Kalamazoo, Mich.
Milprint, Inc., Milwaukee, Wis.
Milwaukee Label & Seal Co., Milwaukee, Wis.
Nalco, Inc., New York, N. Y.
Nevins-Church Press, The, New York, N. Y.
Pacific Label Co., Los Angeles, Calif.
Pollock Paper & Box Co., Dallas, Tex.
Reyburn Mfg. Co., Inc., The, Phila., Pa.
Reynolds Metals Co., Richmond, Va.
Robinson Tag & Label Co., New York, N. Y.
St. Louis Sticker Co., St. Louis, Mo.
Schmidt, Henry & Bro., Inc., Phila., Pa.
Shuman, Frank G. Co., The, Chicago, Ill.
Tablet & Ticket Co., The, Chicago, Ill.
Talmadge Printing Co., New York, N. Y.
Tompkins' Label Service, Phila., Pa.
Traver Corp., Chicago, Ill.
Unique Printed Products Co., Inc., Terre Haute, Ind.
Warner Brothers Co., The, Bridgeport, Conn.
Wheeler-Van Label Corp., Grand Rapids, Mich.
Wynekoop, Walker Co., Chicago, Ill.

LABELS, HEAT SEAL

Attleboro Printing & Embossing Co., Inc., Attleboro, Mass.
Crocker-Union, San Francisco, Calif.
Dennison Mfg. Co., Framingham, Mass.
Ever Ready Label Corp., New York, N. Y.
Foxon Co., The, Providence, R. I.
Johnston Tin Foil & Metal Co., The, St. Louis, Mo.
Menasha Products Co., The, Div. of Marathon Paper Mills Co., Menasha, Wis.
Milprint, Inc., Milwaukee, Wis.
Milwaukee Label & Seal Co., Milwaukee, Wis.
Oliver Machinery Co., Pkg. Div., Grand Rapids, Mich.
Robinson Tag and Label Co., New York, N. Y.
St. Louis Sticker Co., St. Louis, Mo.
Shuman, Frank G. Co., The, Chicago, Ill.

LABELS, PRINTED, LITHOGRAPHED & EMBOSSED

Addison Lithographing Co., Rochester, N. Y.
American Colortype Co., Chicago, Ill.
Andersen, A. J., Chicago, Ill.
Bartlett Label Co., Kalamazoo, Mich.
Brooks & Porter, Inc., New York, N. Y.
Brooks Bank Note Co., Springfield, Mass.
Burt, F. N. Co., Inc., Buffalo, N. Y.
Calvert Lithographing Co., Detroit, Mich.
Cameo Die & Label Co., New York, N. Y.
Central Lithograph Co., The, Cleveland, Ohio
Chaspec Mfg. Co., New York, N. Y.
Consolidated Lithographing Corp., Bklyn, N. Y.
Craftsman Label Co., New York, N. Y.
Creative Printmakers Group, New York, N. Y.
Crocker Union, San Francisco, Calif.
Dennison Mfg. Co., Framingham, Mass.
Economy Novelty & Printing Co., New York, N. Y.
Edwards & Deutsch Lithographing Co., Chicago, Ill.
Empire Lithographing Co., Inc., New York, N. Y.
Eureka Specialty Printing Co., Scranton, Pa.
Ever Ready Label Corp., New York, N. Y.
Fairchild, E. E. Corp., Rochester, N. Y.
Fibreboard Products, San Francisco, Calif.
Fitzhugh, Wm. W. Inc., Bklyn, N. Y.
Fleming-Potter Co., Peoria, Ill.
Forbes Lithograph Mfg. Co., The, Boston, Mass.
Foxon Co., The, Providence, R. I.
Gamse Lithographing Co., Inc., Baltimore, Md.
Grand Rapids Label Co., Grand Rapids, Mich.
Howell, F. M. & Co., Elmira, N. Y.
Kaumagraph Co., Wilmington, Del.
Kindred, MacLean & Co., Inc., Long Island City, N. Y.
Krause, Richard M. Inc., New York, N. Y.
Lambooy Label & Wrapper Co., Kalamazoo, Mich.
Lehman Printing and Litho. Co., San Francisco, Calif.
Magill-Weinsheimer Co., Chicago, Ill.
Market Printing Co., Chicago, Ill.
Michigan Litho. Co., The, Grand Rapids, Mich.

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Milprint, Inc., Milwaukee, Wis.
Milwaukee Label & Seal Co., Milwaukee, Wis.
Muirson Label Co., Inc., Bklyn, N. Y.
Nalco, Inc., New York, N. Y.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
Nashua Package Sealing Co., Inc., Nashua, N. H.
National Color Printing Co., Inc., The, Baltimore, Md.
National Process Co., New York, N. Y.
Nevins-Church Press, New York, N. Y.
Pacific Label Co., Los Angeles, Calif.
Pictorial Paper Package Corp., Aurora, Ill.
Plastic Coating Corp., The, Holyoke, Mass.
Pollock Paper & Box Co., Dallas, Tex.
Progress Lithographing Co., The, Reading, Ohio
Rexford Paper Co., Milwaukee, Wis.
Reyburn Mfg. Co., Inc., Phila., Pa.
Reynolds Metals Co., Richmond, Va.
Robinson Tag & Label Co., New York, N. Y.
Rode & Brand, New York, N. Y.
Roesch, Louis Co., San Francisco, Calif.
Roman, Martin L. Co., The, New York, N. Y.
Rossotti Lithographing Co., Inc., North Bergen, N. J.
Rowell, E. N., Batavia, N. Y.
Royal, Thomas M. & Co., Phila., Pa.
St. Louis Sticker Co., St. Louis, Mo.
Schmidt, Henry & Bro., Inc., Phila., Pa.
Schmidt Lithograph Co., San Francisco, Calif.
Sherman Paper Products Corp., Newton Upper Falls, Mass.
Shuman, Frank G. Co., The, Chicago, Ill.
Stecher-Traung Lithograph Corp., Rochester, N. Y.
Tablet & Ticket Co., The, Chicago, Ill.
Talmadge Printing Co., New York, N. Y.
Tompkins' Label Service, Phila., Pa.
Trade Lithograph & Printing Co., Inc., New York, N. Y.
Trautmann, Bailey & Blampey, New York, N. Y.
Unique Printed Products Co., Inc., Terre Haute, Ind.
U. S. Printing & Lithograph Co., The, Norwood, Cincinnati, Ohio
Waddill Printing & Lithographing Co., Danville, Va.
Waldorf Paper Products Co., St. Paul, Minn.
Warner Bros. Co., The, Bridgeport, Conn.
Weber Addressing Machine Co., Chicago, Ill.
Wheeler-Van Label Co., Grand Rapids, Mich.
Wilkata Folding Box Co., Kearny, N. J.
Wilmanns Bros. Co., Milwaukee, Wis.

LABELS, ROLL TYPE

(For Shipping, Marking, Etc.)

Attleboro Printing & Embossing Co., Inc., Attleboro, Mass.
Bartlett Label Co., Kalamazoo, Mich.
Crocker-Union, San Francisco, Calif.
Dennison Mfg. Co., Framingham, Mass.
Economy Novelty & Printing Co., New York, N. Y.
Ever Ready Label Corp., New York, N. Y.
Foxon Co., The, Providence, R. I.
Grand Rapids Label Co., Grand Rapids, Mich.
Ketcham, Howard Inc., New York, N. Y.
Krause, Richard M. Inc., New York, N. Y.
Lambooy Label & Wrapper Co., Kalamazoo, Mich.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
Oliver Machinery Co., Pkg. Div., Grand Rapids, Mich.
Pollock Paper & Box Co., Dallas, Tex.
Rexford Paper Co., Milwaukee, Wis.
Reyburn Mfg. Co., Inc., The, Phila., Pa.
Robinson Tag & Label Co., New York, N. Y.
Royal, Thomas M. & Co., Phila., Pa.
Shuman, Frank G. Co., The, Chicago, Ill.
Tompkins' Label Service, Phila., Pa.
Unique Printed Products Co., Inc., Terre Haute, Ind.

LABELS, SHIPPING

Bartlett Label Co., Kalamazoo, Mich.
Dennison Mfg. Co., Framingham, Mass.
Economy Novelty & Printing Co., New York, N. Y.
Ever Ready Label Corp., New York, N. Y.
Fleming-Potter Co., Inc., Peoria, Ill.
Foxon Co., The, Providence, R. I.
Glue Fast Equipment Co., Inc., New York, N. Y.
Grand Rapids Label Co., Grand Rapids, Mich.
Howell, F. M. & Co., Elmira, N. Y.
Lambooy Label & Wrapper Co., Kalamazoo, Mich.
Lehmann Printing & Litho. Co., San Francisco, Calif.
Magill-Weinsheimer Co., Chicago, Ill.
Market Printing Co., Chicago, Ill.
Milwaukee Label & Seal Co., Milwaukee, Wis.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
Nashua Package Sealing Co., Inc., Nashua, N. H.
Pictorial Paper Package Corp., Aurora, Ill.
Rexford Paper Co., Milwaukee, Wis.
Reyburn Mfg. Co., Inc., The, Phila., Pa.
Robinson Tag & Label Co., New York, N. Y.
Roman, Martin L. Co., The, New York, N. Y.
St. Louis Sticker Co., St. Louis, Mo.
Shuman, Frank G. Co., The, Chicago, Ill.
Tablet & Ticket Co., The, Chicago, Ill.
Tompkins' Label Service, Phila., Pa.
Unique Printed Products Co., Inc., Terre Haute, Ind.
Wheeler-Van Label Corp., Grand Rapids, Mich.

LABELS, STOCK, LITHOGRAPHED

(Vignette, Etc.)

Bartlett Label Co., Kalamazoo, Mich.
Consolidated Litho. Corp., Bklyn, N. Y.
Crocker-Union, San Francisco, Calif.
Dennison Mfg. Co., Framingham, Mass.
Empire Lithographing Co., Inc., New York, N. Y.
Gamse Lithographing Co., Inc., Baltimore, Md.
Kaumagraph Co., Wilmington, Del.
Lambooy Label & Wrapper Co., Kalamazoo, Mich.
Lehmann Printing & Litho. Co., San Francisco, Calif.
Market Printing Co., Chicago, Ill.
Muirson Label Co., Inc., Bklyn, N. Y.
Nalco, Inc., New York, N. Y.
National Color Printing Co., Inc., Baltimore, Md.
Reyburn Mfg. Co., Inc., Phila., Pa.
Roesch, Louis Co., San Francisco, Calif.
Roman, Martin L. Co., The, New York, N. Y.
Rossotti Lithographing Co., Inc., N. Bergen, N. J.
Schmidt Lithograph Co., San Francisco, Calif.
Stecher-Traung Lithograph Corp., Rochester, N. Y.
Strobridge Lithographing Co., The, Cincinnati, Ohio
Tompkins' Label Service, Phila., Pa.
Trautmann, Bailey & Blampey, New York, N. Y.
Unique Printed Products Co., Inc., Terre Haute, Ind.
U. S. Printing & Lithograph Co., The, Norwood, Cincinnati, Ohio
Waddill Printing & Lithographing Co., Danville, Va.

LABELS, TRANSPARENT

Bender, H. P., New York, N. Y.
Cellulose Packaging Corp., New York, N. Y.
Crystal Transparent Mfg. Co., Inc., New York, N. Y.
Crystal Tube Corp., Chicago, Ill.
Dennison Mfg. Co., Framingham, Mass.
Dobeckmun Co., The, Cleveland, Ohio
Ever Ready Label Corp., New York, N. Y.
Foxon Co., The, Providence, R. I.
Lambooy Label & Wrapper Co., Kalamazoo, Mich.
Milprint, Inc., Milwaukee, Wis.
Milwaukee Label & Seal Co., Milwaukee, Wis.
Neostyle, Inc., Chicago, Ill.
Pacific Label Co., Los Angeles, Calif.
Palm, Fechteler & Co., New York, N. Y.
Paramount Paper Prods. Co., Inc., Phila., Pa.
Robinson Tag & Label Co., New York, N. Y.
Royal, Thomas M. & Co., Phila., Pa.
St. Louis Sticker Co., St. Louis, Mo.
Shellmar Products Co., Mt. Vernon, Ohio
Tablet & Ticket Co., The, Chicago, Ill.
Tompkins' Label Service, Phila., Pa.
Traver Corp., Chicago, Ill.
Unique Printed Products Co., Inc., Terre Haute, Ind.
Wheeler-Van Label Co., Grand Rapids, Mich.

LABELS, WATER-RESISTANT

Crocker-Union, San Francisco, Calif.
Dennison Mfg. Co., Framingham, Mass.
Johnston Tin Foil & Metal Co., The, St. Louis, Mo.
Kelly, E. J. Co., Kalamazoo, Mich.
Milprint, Inc., Milwaukee, Wis.
Reynolds Metals Co., Richmond, Va.
Robinson Tag & Label Co., New York, N. Y.
Shuman, Frank G. Co., The, Chicago, Ill.
Stecher-Traung Lithograph Corp., Rochester, N. Y.

LEATHERETTE

See also Paper, Imitation Leather

Atlas Powder Co., Zapon Div., Stamford, Conn., & North Chicago, Ill.
Columbus Coated Fabrics Corp., Columbus, Ohio
Dejonge, Louis & Co., New York, N. Y.
Du Pont de Nemours, E. I. & Co., Inc., Wilmington, Del.
Griffin, Campbell, Hayes, Walsh, Inc., New York, N. Y.
Holliston Mills, Inc., The, Norwood, Mass.
Marvellum Co., Holyoke, Mass.
Matthias Paper Corp., Phila., Pa.
Pyrotex Leather Co., Leominster, Mass.
Riegel Paper Corp., New York, N. Y.
Sherman Paper Products Corp., Newton Upper Falls, Mass.
Textileather Corp., Toledo, Ohio
U. S. Rubber Co., New York, N. Y.

LINERS, BOX, BARREL AND BAG

Andrews, O. B. Co., Chattanooga, Tenn.
Angier Corp., Framingham, Mass.
Arkell Safety Bag Co., New York, N. Y.
Bemis Bro. Bag Co., St. Louis, Mo.
Betner, Benj. C. Co., Devon, Pa.
Central States Paper & Bag Co., St. Louis, Mo.
Central Waxed Paper Co., Chicago, Ill.
Cincinnati Industries, Inc., Cincinnati (Lockland), Ohio
Cromwell Paper Co., The, Chicago, Ill.
Dejonge, Louis & Co., New York, N. Y.
Dobeckmun Co., The, Cleveland, Ohio

Bold-face listings indicate advertisers in this issue

Equitable Paper Bag Co., Inc., Long Island City, N. Y.
Fibreboard Products, Inc., San Francisco, Calif.
Fitchburg Paper Co., Fitchburg, Mass.
Fulton Bag & Cotton Mills, Atlanta, Ga.
Gardner-Richardson Co., The, Middletown, Ohio
Goodyear Tire & Rubber Co., Akron, Ohio
Hummel-Ross Fibre Corp., Hopewell, Va.
Inland Container Corp., Indianapolis, Ind.
Interstate Folding Box Co., Middletown, Ohio
Johnston Tin Foil & Metal Co., The, St. Louis, Mo.
Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
LaBoiteaux Co., Inc., The, Cincinnati, Ohio
Matthias Paper Corp., Phila., Pa.
Menasha Products Co., The, Div. Marathon Paper Mills, Menasha, Wis.
Milprint, Inc., Milwaukee, Wis.
Munson Bag Co., The, Cleveland, Ohio
Nashau Gummed & Coated Paper Co., Nashua, N. H.
National Water-Proofing Co., Camden, N. J.
Paterson Parchment Paper Co., Bristol, Pa.
Pollock Paper & Box Co., Dallas, Tex.
Rexford Paper Co., Milwaukee, Wis.
Reynolds Metals Co., Richmond, Va.
Riegel Paper Corp., New York, N. Y.
St. Regis Paper Co., New York, N. Y.
Schmidt Lithograph Co., San Francisco, Calif.
Shellmar Products Co., Mt. Vernon, Ohio
Sherman Paper Products Corp., Newton Upper Falls, Mass.
Sweetnam, Geo. H. Inc., Cambridge, Mass.
Traver Corp., Chicago, Ill.
Ullman Bag Co., Detroit, Mich.
Williams, Chas. W. & Co., Inc., New York, N. Y.

OPENING TAPE

(For Cellophane Packages)

Chicago Printed String Co., Chicago, Ill.
Dobeckmun Co., The, Cleveland, Ohio
Du Pont de Nemours, E. I. & Co., Inc., Wilmington, Del.
Fibre Cord Co., New York, N. Y.
Food Packaging Div. of Milprint, Inc., Milwaukee, Wis.
Shellmar Products Co., Mt. Vernon, Ohio
Sylvania Industrial Corp., New York, N. Y.
Walser Mfg. Co., Inc., Clifton, N. J.

PADDING & WADDING

American Excelsior Corp., Chicago, Ill.
American Lace Paper Co., Milwaukee, Wis.
Cellulose Wadding Products, Inc., Garwood, N. J.
Cottonluxe Mfg., Co., New York, N. Y.
Excelsior Paper Specialties Co., Inc., New York, N. Y.
Kimberly-Clark Corp., Neenah, Wis.
Republic Paperboard Co., The, Cincinnati, Ohio
Rinkle Krinkle Paper Co., Boston, Mass.
Sweetnam, Geo. H. Inc., Cambridge, Mass.
Union Wadding Co., Pawtucket, R. I.

PAPER, ALKALI-PROOF

Bradner Smith & Co., Chicago, Ill.
Bulkley, Dunton & Co., New York, N. Y.
Carbide & Carbon Chemicals Corp., New York, N. Y.
Champion Paper & Fibre Co., Hamilton, Mass.
Decotone Products, Div. Fitchburg Paper Co., Fitchburg, Mass.
Dejonge, Louis & Co., New York, N. Y.
Dunn Sulphite Paper Co., Port Huron, Mich.
Fitchburg Paper Co., Fitchburg, Mass.
General Felt Products, Inc., Bklyn, N. Y.
Hollingsworth & Whitney Co., Boston, Mass.
Holyoke Card & Paper Co., Springfield, Mass.
Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Keller-Dorian Corp., New York, N. Y.
Matthias Paper Corp., Phila., Pa.
Milprint, Inc., Milwaukee, Wis.
Newark Paraffine & Parchment Paper Co., Newark, N. J.
Plastic Coating Corp., Holyoke, Mass.
Port Huron Sulphite & Paper Co., Port Huron, Mich.
Riegel Paper Corp., New York, N. Y.
Smith, H. P. Paper Co., Chicago, Ill.
Union Carbide & Carbon Corp., New York, N. Y.
Warren, S. D. Co., Boston, Mass.
Williams, Chas. W. & Co., Inc., New York, N. Y.
Wyomissing Glazed Paper Co., Reading, Pa.

PAPER, ANTI-TARNISH

Angier Corp., Framingham, Mass.
Bradner Smith & Co., Chicago, Ill.
Bulkley, Dunton & Co., New York, N. Y.
Chemical Paper Mfg. Co., Holyoke, Mass.
Cromwell Paper Co., The, Chicago, Ill.
Crystal Tissue Co., Middletown, Ohio
Decotone Products, Div. Fitchburg Paper Co., Fitchburg, Mass.
Dejonge, Louis & Co., New York, N. Y.
Dennison Mfg. Co., Framingham, Mass.
Fitchburg Paper Co., Fitchburg, Mass.
Hazen Paper Co., Holyoke, Mass.
Hollingsworth & Whitney Co., Boston, Mass.
Holyoke Card & Paper Co., Springfield, Mass.
Hughes & Hoffman, New York, N. Y.
Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Keller-Dorian Corp., New York, N. Y.
Marvellum Co., The, Holyoke, Mass.
Matthias Paper Corp., Phila., Pa.
Mosinee Paper Mills Co., Mosinee, Wis.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
Newark Paraffine & Parchment Paper Co., Newark, N. J.
Paterson Parchment Paper Co., Bristol, Pa.
Plastic Coating Corp., Holyoke, Mass.
Riegel Paper Corp., New York, N. Y.
Rondout Paper Mills, Inc., Napanoch, N. Y.
Shawmut Waxed Paper Co., Holliston, Mass.
Smith, H. P. Paper Co., Chicago, Ill.
Sweetman, Geo. H. Inc., Cambridge, Mass.
United Mfg. Co., Springfield, Mass.
Warren, S. D. Co., Boston, Mass.
Williams, Chas. W. & Co., Inc., New York, N. Y.

PAPER, CELLULOSE LAMINATED

Arvey Corp., Chicago, Ill., & Jersey City, N. J.
Central Waxed Paper Co., Chicago, Ill.
Decotone Products, Div. Fitchburg Paper Co., Fitchburg, Mass.
Dobeckmun Co., The, Cleveland, Ohio
General Felt Products, Inc., Bklyn, N. Y.
Keller-Dorian Corp., New York, N. Y.
Kimberly-Clark Corp., Neenah, Wis.
Marvellum Co., The, Holyoke, Mass.
Matthias Paper Corp., Phila., Pa.
McLaurin-Jones Co., Brookfield, Mass.
Milprint, Inc., Milwaukee, Wis.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
Riegel Paper Corp., New York, N. Y.
Salwen, Joe Paper Co., New York, N. Y.
Shellmar Products Co., Mt. Vernon, Ohio
Sherman Paper Products Corp., Newton Upper Falls, Mass.
Smith, H. P. Paper Co., Chicago, Ill.
Southern Waxed Paper Co., Atlanta, Ga.
U. S. Finishing & Mfg. Co., Chicago, Ill.
Williams, Chas. W. & Co., Inc., New York, N. Y.

PAPER, CLOTH LINED

Atlantic Gummed Paper Corp., Bklyn, N. Y.
Marvellum Co., The, Holyoke, Mass.
Matthias Paper Corp., Phila., Pa.
McLaurin-Jones Co., Brookfield, Mass.
Middlesex Products Corp., Cambridge, Mass.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
National Water-Proofing Co., Camden, N. J.
Rexford Paper Co., Milwaukee, Wis.
Twitchell, E. W. Inc., Packaging Div., Phila., Pa.
United Mfg. Co., Springfield, Mass.
Williams, Chas. W. & Co., Inc., New York, N. Y.

PAPER, CORRUGATED

(Flexible, Wrapping & Packing)

Andrews, O. B. Co., Chattanooga, Tenn.
Angier Corp., Framingham, Mass.
Ashtabula Corrugated Box Co., The, Ashtabula, Ohio
Blake, Moffitt & Towne, San Francisco, Calif.
Cincinnati Industries, Inc., Cincinnati (Lockland), Ohio.
Fibreboard Products, Inc., San Francisco, Calif.
Fort Wayne Corrugated Paper Co., Fort Wayne, Ind.
Gair, Robert Co., Inc., New York, N. Y.
Gaylord Container Corp., St. Louis, Mo.
Grand-City Container Corp., New York, N. Y.
Hinde & Dauch Paper Co., The, Sandusky, Ohio
Inland Container Corp., Indianapolis, Ind.
Kress, F. J. Box Co., Pittsburgh, Pa.
National Container Corp., Long Island City, N. Y.
Owens-Illinois Glass Co., Toledo, Ohio
Salwen, Joe Paper Co., New York, N. Y.
Sherman Paper Products Corp., Newton Upper Falls, Mass.
Sweetnam, Geo. H. Inc., Cambridge, Mass.
Twitchell, E. W., Inc., Pkg. Div., Phila., Pa.

PAPER, CORRUGATED

(For Window Trimming)

Excelsior Paper Specialties Co., Inc., New York, N. Y.
Fibreboard Products, Inc., San Francisco, Calif.
Gaylord Container Corp., St. Louis, Mo.
Hankins Container Co., Cleveland, Ohio
Hinde & Dauch Paper Co., The, Sandusky, Ohio
Inland Container Corp., Indianapolis, Ind.
Reyburn Mfg. Co., Inc., The, Phila., Pa.
Sherman Paper Products Corp., Newton Upper Falls, Mass.
Sweetnam, Geo. H. Inc., Cambridge, Mass.

PAPER, CREPE

American Tissue Mills, Holyoke, Mass.
Cincinnati Industries Inc., Cincinnati (Lockland), Ohio
Dennison Mfg. Co., Framingham, Mass.
Dunn Sulphite Paper Co., Port Huron, Mich.
Erving Paper Mills, Erving, Mass.
Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Mosinee Paper Mills Co., Mosinee, Wis.
Port Huron Sulphite & Paper Co., Port Huron, Mich.
Reyburn Mfg. Co., Inc., The, Phila., Pa.
Rinkle Krinkle Paper Co., Boston, Mass.

XUM

Sherman Paper Products Corp., Newton Upper Falls, Mass.
Sweetnam, Geo. H. Inc., Cambridge, Mass.
Terkelsen Machine Co., Boston, Mass.

PAPER, EXCELSIOR & SHREDDED

American Excelsior Corp., Chicago, Ill.
Atlantic Excelsior Co., Inc., New York, N. Y.
Ben Mont Papers, Inc., Bennington, Vt.
Crystal Tissue Co., The, Middletown, Ohio
Daniels Mfg. Co., Rhinelander, Wis.
Dennison Mfg. Co., Framingham, Mass.
Dunn Sulphite Paper Co., Port Huron, Mich.
Erving Paper Mills, Erving, Mass.
Excelsior Paper Specialties Co., Inc., New York, N. Y.
Inland Container Corp., Indianapolis, Ind.
Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Newark Paraffine & Parchment Paper Co., Newark, N. J.
Specialty Papers Co., Dayton, Ohio
Sweetnam, Geo. H. Inc., Cambridge, Mass.
Traver Corp., Chicago, Ill.

PAPER, FANCY PRINTED OR EMBOSSED

Aldine Paper Co., New York, N. Y.
Anderson, George W. Inc. Long Island City, N. Y.
Ben Mont Papers, Inc., Bennington, Vt.
Blake, Moffitt & Towne, San Francisco, Calif.
Bradner Smith & Co., Chicago, Ill.
Chemical Paper Mfg. Co., Holyoke, Mass.
Chicago Printed String Co., Chicago, Ill.
Crown Zellerbach Corp., San Francisco, Calif.
Crystal Tissue Co., Middletown, Ohio
Decotone Products, Div. Fitchburg Paper Co., Fitchburg, Mass.
Dejonge, Louis & Co., New York, N. Y.
Dennison Mfg. Co., Framingham, Mass.
District of Columbia Paper Mills, Inc., Washington, D. C.
Eureka Specialty Prtg. Co., Scranton, Pa.
Frann Paper Co., New York, N. Y.
Hampden Glazed Paper & Card Co., Holyoke, Mass.
Hazen Paper Co., Holyoke, Mass.
Hinkson Paper Co., Palmer, Mass.
Holyoke Card & Paper Co., Springfield, Mass.
Hughes & Hoffman, New York, N. Y.
Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Keller-Dorian Corp., New York, N. Y.
Kupfer Bros. Co., New York, N. Y.
Marvellum Co., The, Holyoke, Mass.
Matthias Paper Corp., Phila., Pa.
Middlesex Products Corp., Cambridge, Mass.
Narragansett Coated Paper Corp., Pawtucket, R. I.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
New England Card & Paper Co., Inc., Springfield, Mass.
Paper Affiliates Co., New York, N. Y.
Paper City Mfg. Co., Inc., Holyoke, Mass.
Pejepscot Paper Co., New York, N. Y.
Plastic Coating Corp., Holyoke, Mass.
Port Huron Sulphite & Paper Co., Port Huron, Mich.
Racquette River Paper Co., Potsdam, N. Y.
Reynolds Metals Co., Richmond, Va.
Riegel Paper Corp., New York, N. Y.
Royal Paper Corp., New York, N. Y.
Shellmar Products Co., Mount Vernon, Ohio
Simplex Textured Reproductions, Inc., New York, N. Y.
Springfield Coated Paper Corp., Camden, N. J.
Stecher-Traung Lithograph Corp., Rochester, N. Y.
Stevens-Nelson Paper Corp., The, New York, N. Y.
Sweetnam, Geo. H. Inc., Cambridge, Mass.
Tamm & Co., New York, N. Y.
Trautmann, Bailey & Blampey, New York, N. Y.
Traver Corp., Chicago, Ill.
Twitchell, E. W. Inc., Pkg. Div., Phila., Pa.
United Mfg. Co., Springfield, Mass.
Williams, Chas. W. & Co., Inc., New York, N. Y.
Wyomissing Glazed Paper Co., Reading, Pa.

PAPER, FLINT GLAZED

Blake, Moffitt & Towne, San Francisco, Calif.
Bradner Smith & Co., Chicago, Ill.
Dejonge, Louis & Co., New York, N. Y.
Fitchburg Paper Co., Fitchburg, Mass.
Frann Paper Co., New York, N. Y.
Hampden Glazed Paper & Card Co., Holyoke, Mass.
Hazen Paper Co., Holyoke, Mass.
Hinkson Paper Co., Palmer, Mass.
Hughes & Hoffman, New York, N. Y.
Keller-Dorian Corp., New York, N. Y.
Kupfer Bros. Co., New York, N. Y.
Matthias Paper Corp., Phila., Pa.
McLaurin-Jones Co., Brookfield, Mass.
Paper Affiliates Co., New York, N. Y.
Royal Paper Corp., New York, N. Y.
United Mfg. Co., Springfield, Mass.
Warren, S. D. Co., Boston, Mass.
Williams, Chas. W. & Co., Inc., New York, N. Y.
Wyomissing Glazed Paper Co., Reading, Pa.

PAPER, FRICTION GLAZED

Ben Mont Papers Inc., Bennington, Vt.
Blake, Moffitt & Towne, San Francisco, Calif.
Bradner Smith & Co., Chicago, Ill.
Champion Paper & Fibre Co., The, Hamilton, Ohio
Crown Zellerbach Corp., San Francisco, Calif.
Dejonge, Louis & Co., New York, N. Y.
Dennison Mfg. Co., Framingham, Mass.
Fitchburg Paper Co., Fitchburg, Mass.
Frann Paper Co., New York, N. Y.
Hampden Glazed Paper & Card Co., Holyoke, Mass.
Hinkson Paper Co., Palmer, Mass.
Hughes & Hoffman, New York, N. Y.
Keller-Dorian Corp., New York, N. Y.
Kupfer Bros. Co., New York, N. Y.
Marvellum Co., The, Holyoke, Mass.
Matthias Paper Corp., Phila., Pa.
Middlesex Products Corp., Cambridge, Mass.
Narragansett Coated Paper Corp., Pawtucket, R. I.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
Paper Affiliates Co., New York, N. Y.
Royal Paper Corp., New York, N. Y.
Springfield Coated Paper Corp., Camden, N. J.
United Mfg. Co., Springfield, Mass.
Williams, Chas. W. & Co., Inc., New York, N. Y.
Wyomissing Glazed Paper Co., Reading, Pa.

PAPER, GLASSINE

(Plain & Embossed)

Daniels Mfg. Co., Rhinelander, Wis.
Deerfield Glassine Co., Monroe Bridge, Mass.
Dennison Mfg. Co., Framingham, Mass.
Glassine Paper Co., Conshohocken, Pa.
Hamersley Mfg. Co., The, Garfield, N. J.
Hartford City Paper Co., New York, N. Y.
Milprint, Inc., Milwaukee, Wis.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
Newark Paraffine & Parchment Paper Co., Newark, N. J.
Rhinelander Paper Co., Rhinelander, Wis.
Riegel Paper Corp., New York, N. Y.
Smith, H. P. Paper Co., Chicago, Ill.
Southern Waxed Paper Co., Atlanta, Ga.
Sweetnam, George H. Inc., Cambridge, Mass.
Westfield River Paper Co., Inc., Russell, Mass.

PAPER, GREASEPROOF

Angier Corp., Framingham, Mass.
Cromwell Paper Co., The, Chicago, Ill.
Decotone Products, Div. Fitchburg Paper Co., Fitchburg, Mass.
Deerfield Glassine Co., Monroe Bridge, Mass.
Dennison Mfg. Co., Framingham, Mass.
Hamersley Mfg. Co., The, Garfield, N. J.
Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Keller-Dorian Corp., New York, N. Y.
Marvellum Co., The, Holyoke, Mass.
McLaurin-Jones Co., Brookfield, Mass.
Milprint, Inc., Milwaukee, Wis.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
Riegel Paper Corp., New York, N. Y.
Sherman Paper Products Corp., Newton Upper Falls, Mass.
Sweetnam, George H. Inc., Cambridge, Mass.
Twitchell, E. W. Inc., Packaging Div., Phila., Pa.
Williams, Chas. W. & Co., Inc., New York, N. Y.

PAPER, GUMMED

Angier Corp., Framingham, Mass.
Atlantic Gummed Paper Corp., Bklyn, N. Y.
Better Packages, Inc., Shelton, Conn.
Brown-Bridge Mills, Inc., The, Troy, Ohio
Dennison Mfg. Co., Framingham, Mass.
Eureka Specialty Printing Co., Scranton, Pa.
Gummed Products Co., The, Troy, Ohio
Gummed Tape & Devices Co., Bklyn, N. Y.
Knowlton, M. D. Co., Rochester, N. Y.
Matthias Paper Corp., Phila., Pa.
McLaurin-Jones Co., Brookfield, Mass.
Mid-States Gummed Paper Co., Chicago, Ill.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
Rexford Paper Co., Milwaukee, Wis.
Twitchell, E. W. Inc., Packaging Div., Phila., Pa.

PAPER, HEAT SEALING

Central Waxed Paper Co., Chicago, Ill.
Decotone Products, Div. Fitchburg Paper Co., Fitchburg, Mass.
Dennison Mfg. Co., Framingham, Mass.
Goodyear Tire & Rubber Co., Akron, Ohio
Johnston Tin Foil & Metal Co., The, St. Louis, Mo.
Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Keller-Dorian Corp., New York, N. Y.
Marvellum Co., The, Holyoke, Mass.
McLaurin-Jones Co., Brookfield, Mass.
Menasha Products Co., The, Div. of Marathon Paper Mills Co., Menasha, Wis.
Milprint, Inc., Milwaukee, Wis.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
Pyrotex Leather Co., Leominster, Mass.
Riegel Paper Corp., New York, N. Y.
Shellmar Products Co., Mt. Vernon, Ohio
Traver Corp., Chicago, Ill.
Twitchell, E. W. Inc., Packaging Div., Phila., Pa.
U. S. Finishing & Mfg. Co., Chicago, Ill.
Williams, Chas. W. & Co., Inc., New York, N. Y.

PAPER, IMITATION FOIL

Aldine Paper Co., New York, N. Y.
Bradner Smith & Co., Chicago, Ill.
Dejonge, Louis & Co., New York, N. Y.
Frann Paper Co., New York, N. Y.
Hampden Glazed Paper & Card Co., Holyoke, Mass.
Hughes & Hoffman, New York, N. Y.
Keller-Dorian Corp., New York, N. Y.
Kupfer Bros. Co., New York, N. Y.
Marvellum Co., The, Holyoke, Mass.
Matthias Paper Co., Phila., Pa.
Middlesex Products Corp., Cambridge, Mass.
Miller Paper Co., New York, N. Y.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
Paper Affiliates Co., New York, N. Y.
Riegel Paper Corp., New York, N. Y.
Warren, S. D. Co., Boston, Mass.
Williams, Chas. W. & Co., Inc., New York, N. Y.
Wyomissing Glazed Paper Co., Reading, Pa.

PAPER, IMITATION LEATHER

Aldine Paper Co., Inc., New York, N. Y.
Anderson, George W. Inc., Long Island City, N. Y.
Atlas Powder Co., Zapon Div., Stamford, Conn., & North Chicago, Ill.
Blake, Moffitt & Towne, San Francisco, Calif.
Bradner Smith & Co., Chicago, Ill.
Cincinnati Industries, Inc., Cincinnati (Lockland), Ohio
Columbus Coated Fabrics Corp., Columbus, Ohio
Dejonge, Louis & Co., New York, N. Y.
Du Pont de Nemours, E. I. & Co., Inc., Wilmington, Del.
Frann Paper Co., New York, N. Y.
Hampden Glazed Paper & Card Co., Holyoke, Mass.
Hazen Paper Co., Holyoke, Mass.
Hinkson Paper Co., Palmer, Mass.
Holyoke Card & Paper Co., Springfield, Mass.
Hughes & Hoffman, New York, N. Y.
Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Keller-Dorian Corp., New York, N. Y.
Kupfer Bros. Co., New York, N. Y.
Marvellum Co., The, Holyoke, Mass.
Matthias Paper Corp., Phila., Pa.
Middlesex Products Corp., Cambridge, Mass.
Narragansett Coated Paper Corp., Pawtucket, R. I.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
New England Card & Paper Co., Inc., Springfield, Mass.
Paper Affiliates Co., New York, N. Y.
Plastic Coating Corp., Holyoke, Mass.
Port Huron Sulphite & Paper Co., Port Huron, Mich.
Pyrotex Leather Co., Leominster, Mass.
Racquette River Paper Co., Potsdam, N. Y.
Riegel Paper Corp., New York, N. Y.
Royal Paper Corp., New York, N. Y.
Sherman Paper Products Corp., Newton Upper Falls, Mass.
Springfield Coated Paper Corp., Camden, N. J.
Tamm & Co., New York, N. Y.
Textileather Corp., Toledo, Ohio
United Mfg. Co., Springfield, Mass.
Williams, Chas. W. & Co., Inc., New York, N. Y.

PAPER, KRAFT

Crystal Tissue Co., Middletown, Ohio
Dunn Sulphite Paper Co., Port Huron, Mich.
Gaylord Container Corp., St. Louis, Mo.
Hummel-Ross Fibre Corp., Hopewell, Va.
Mosinee Paper Mills Co., Moisinee, Wis.
Newark Paraffine & Parchment Paper Co., Newark, N. J.
Riegel Paper Corp., New York, N. Y.
Union Bag & Paper Corp., New York, N. Y.

PAPER, MAT- OR ANTIQUE-COATED

Aldine Paper Co., New York, N. Y.
Bradner Smith & Co., Chicago, Ill.
Dejonge, Louis & Co., New York, N. Y.
Frann Paper Co., New York, N. Y.
Hampden Glazed Paper & Card Co., Holyoke, Mass.
Hughes & Hoffman, New York, N. Y.
Kupfer Bros. Co., New York, N. Y.
Marvellum Co., The, Holyoke, Mass.
Matthias Paper Corp., Phila., Pa.
Middlesex Products Corp., Cambridge, Mass.
Paper Affiliates Co., New York, N. Y.
United Mfg. Co., Springfield, Mass.
Williams, Chas. W. & Co., Inc., New York, N. Y.
Wyomissing Glazed Paper Co., Reading, Pa.

PAPER, METALLIC-COATED
(Plain and Embossed)

Aldine Paper Co., New York, N. Y.
Artcote Papers, Inc., Irvington, N. J.
Blake, Moffitt & Towne, San Francisco, Calif.
Bradner Smith & Co., Chicago, Ill.
Decotone Products, Div. Fitchburg Paper Co., Fitchburg, Mass.
Dejonge, Louis & Co., New York, N. Y.
Dennison Mfg. Co., Framingham, Mass.
Eureka Specialty Printing Co., Scranton, Pa.
Frann Paper Co., New York, N. Y.
Hampden Glazed Paper & Card Co., Holyoke, Mass.
Hazen Paper Co., Holyoke, Mass.
Hinkson Paper Co., Palmer, Mass.
Holyoke Card & Paper Co., Springfield, Mass.
Hughes & Hoffman, New York, N. Y.
Johnston Tin Foil & Metal Co., The, St. Louis, Mo.
Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Keller-Dorian Corp., New York, N. Y.
Kupfer Bros., Co., New York, N. Y.
Marvellum Co., The, Holyoke, Mass.
Matthias Paper Corp., Phila., Pa.
McLaurin-Jones Co., Brookfield, Mass.
Middlesex Products Corp., Cambridge, Mass.
Miller Paper Co., New York, N. Y.
Narragansett Coated Paper Corp., Pawtucket, R. I.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
New England Card & Paper Co., Inc., Springfield, Mass.
Paper Affiliates Co., New York, N. Y.
Plastic Coating Corp., Holyoke, Mass.
Pyrotex Leather Co., Leominster, Mass.
Racquette River Paper Co., Potsdam, N. Y.
Reynolds Metals Co., Richmond, Va.
Riegel Paper Corp., New York, N. Y.
Royal Paper Corp., New York, N. Y.
Springfield Coated Paper Corp., Camden, N. J.
Stevens-Nelson Paper Corp., The, New York, N. Y.
United Mfg. Co., Springfield, Mass.
Warren, S. D. Co., Boston, Mass.
Williams, Chas. W. & Co, Inc., New York, N. Y.
Wyomissing Glazed Paper Co., Reading, Pa.

PAPER, MICA-COATED

Aldine Paper Co., New York, N. Y.
Bradner Smith & Co., Chicago, Ill.
Decotone Products, Div. Fitchburg Paper Co., Fitchburg, Mass.
Dejonge, Louis & Co., New York, N. Y.
Hampden Glazed Paper & Card Co., Holyoke, Mass.
Hughes & Hoffman, New York, N. Y.
Kupfer Bros. Co., New York, N. Y.
Marvellum Co., The, Holyoke, Mass.
Matthias Paper Corp., Phila., Pa.
Middlesex Products Corp., Cambridge, Mass.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
Paper Affiliates Co., New York, N. Y.
Tamm & Co., New York, N. Y.
United Mfg. Co., Springfield, Mass.
Williams, Chas. W. & Co., Inc., New York, N. Y.
Wyomissing Glazed Paper Co., Reading, Pa.

PAPER, MOISTURE-VAPOR RESISTANT

Angier Corp., Framingham, Mass.
Bulkley, Dunton & Co., New York, N. Y.
Cincinnati Industries, Inc., Cincinnati (Lockland), Ohio
Cromwell Paper Co., The, Chicago, Ill.
ecotone Products, Div. Fitchburg Paper Co., Fitchburg, Mass.
Deerfield Glassine Co., Monroe Bridge, Mass.
Dejonge, Louis & Co., New York, N. Y.
Dennison Mfg. Co., Framingham, Mass.
Dobeckmun Co., The, Cleveland, Ohio
General Felt Products, Inc., Bklyn, N. Y.
Hazen Paper Co., Holyoke, Mass.
Holyoke Card & Paper Co., Springfield, Mass.
Hughes & Hoffman, New York, N. Y.
Johnston Tin Foil & Metal Co., The, St. Louis, Mo.
Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Keller-Dorian Corp., New York, N. Y.
Marvellum Co., The, Holyoke, Mass.
Matthias Paper Corp., Phila., Pa.
McLaurin-Jones Co., Brookfield, Mass.
Mosinee Paper Mills Co., Mosinee, Wis.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
National Water-Proofing Co., Camden, N. J.
Paterson Parchment Paper Co., Bristol, Pa.
Plastic Coating Corp., Holyoke, Mass.
Rexford Paper Co., Milwaukee, Wis.
Reynolds Metals Co., Richmond, Va.
Riegel Paper Corp., New York, N. Y.
Shawmut Waxed Paper Co., Holliston, Mass.
Shellmar Products Co., Mt. Vernon, Ohio
Sisalkraft Co., The, Chicago, Ill.
Southern Waxed Paper Co., Atlanta, Ga.
Sylvania Industrial Corp., New York, N. Y.
Twitchell, E. W. Inc., Pkg. Div., Phila., Pa.
U. S. Finishing & Mfg. Co., Chicago, Ill.
Westfield River Paper Co., Inc., Russell, Mass.
Williams, Chas. W. & Co., Inc., New York, N. Y.

PAPER, NON-CORROSIVE

Angier Corp., Framingham, Mass.
Decotone Products, Div. Fitchburg Paper Co., Fitchburg, Mass.
Dejonge, Louis & Co., New York, N. Y.
Dennison Mfg. Co., Framingham, Mass.
Marvellum Co., The, Holyoke, Mass.
Mosinee Paper Mills Co., Mosinee, Wis.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
Riegel Paper Corp., New York, N. Y.
Sherman Paper Products Corp., Newton Upper Falls, Mass.
Twitchell, E. W. Inc., Pkg. Div., Phila., Pa.
Williams, Chas. W. & Co., Inc., New York, N. Y.

XUM

PAPER, PARCHMENT

Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Newark Paraffine & Parchment Paper Co., Newark, N. J.
Paterson Parchment Paper Co., Bristol, Pa.
Riegel Paper Corp., New York, N. Y.
Sweetnam, George H. Inc., Cambridge, Mass.

PAPER, PYROXYLIN-COATED

Artcote Papers, Inc., Irvington, N. J.
Blake, Moffitt & Towne, San Francisco, Calif.
Bradner Smith & Co., Chicago, Ill.
Dejonge, Louis & Co., New York, N. Y.
Dennison Mfg. Co., Framington, Mass.
Du Pont de Nemours, E. I. & Co., Inc., Wilmington, Del.
Frann Paper Co., New York, N. Y.
General Felt Products, Inc., Bklyn, N. Y.
Hampden Glazed Paper & Card Co., Holyoke, Mass.
Hazen Paper Co., Holyoke, Mass.
Hughes & Hoffman, New York, N. Y.
Keller-Dorian Corp., New York, N. Y.
Kupfer Bros. Co., New York, N. Y.
McLaurin-Jones Co., Brookfield, Mass.
Marvellum Co., The, Holyoke, Mass.
Matthias Paper Corp., Phila., Pa.
Miller Paper Co., New York, N. Y.
Narragansett Coated Paper Corp., Pawtucket, R. I.
Paper Affiliates Co., New York, N. Y.
Plastic Coating Corp., Holyoke, Mass.
Pyrotex Leather Co., Leominster, Mass.
Riegel Paper Corp., New York, N. Y.
Royal Paper Corp., New York, N. Y.
Williams, Chas. W. & Co., Inc., New York, N. Y.

PAPER, TISSUE

Adams Paper Co., Wells River, Vt.
American Tissue Mills, Holyoke, Mass.
Ashuelot Paper Co., Hinsdale, N. H.
Ben Mont Papers, Inc., Bennington, Vt.
Berwin Paper Corp., Dansville, N. Y.
Brooks Paper Co., St. Louis, Mo.
Burrows Paper Corp., Little Falls, N. Y.
Central Paper Corp., Muskegon, Mich.
Chicago Printed String Co., Chicago, Ill.
Consolidated Water & Power Co., Wisconsin Rapids, Wis.
Coy Paper Co., Claremont, N. H.
Crown-Willamette Paper Co., San Francisco, Calif.
Dennison Mfg. Co., Framingham, Mass.
Detroit Sulphite & Paper Co., Detroit, Mich.
Dexter, C. H. & Sons, Inc., Windsor Locks, Conn.
Diamond Paper Mills Co., Inc., New York, N. Y.
Dunn Sulphite Paper Co., Port Huron, Mich.
Earl, M. J. Co., Inc., Reading, Pa.
Economy Box & Pie Plate Co., Marion, Ind.
Eden Paper Co., Lancaster, Pa.
Erving Paper Mills, Erving, Mass.
Fernstrom Paper Mills, Inc., Pomona, Calif.
Fillmore & Slade, No. Bennington, Vt.
Flower City Tissue Mills Co., Rochester, N. Y.
Fort Howard Paper Co., Green Bay, Wis.
Frost White Paper Mills, Inc., New York, N. Y.
General Cellulose Co., Inc., The, Garwood, N. J.
Gotham Tissue Corp., New York, N. Y.
Graham Mfg. Co., Holyoke, Mass.
Hamersley Mfg. Co., Garfield, N. J.
Hawley Pulp & Paper Co., Portland, Ore.
Hoberg Paper Mills, Green Bay, Wis.
Hudson Pulp & Paper Corp., New York, N. Y.
International Paper Co., New York, N. Y.
Latimer, E. Jr., & Co., Phila., Pa.
Little Falls Paper Co., Inc., Newburgh, N. Y.
McIntyre Bros. Paper Co., Inc., Fayetteville, N. Y.
Menasha Products Co., Div. of Marathon Paper Mills Co., Menasha, Wis.
Minerva Wax Paper Co., Minerva, Ohio
Mohawk Valley Paper Co., Inc., Little Falls, N. Y.
Moyer & Pratt, Inc., Lyonsdale, N. Y.
North American Pulp & Paper Co., New York, N. Y.
North End Paper Co., Fulton, N. Y.
Northern Paper Mills, Green Bay, Wis.
Oswego River Paper Mills, Phoenix, N. Y.
Pacific Coast Paper Mills, Bellingham, Wash.
Peerless Paper Mills, Inc., Oaks, Pa.
Pequannock Valley Paper Co., Butler, N. J.
Port Huron Sulphite & Paper Co., Port Huron, Mich.
Reed Tissue Corp., Little Falls, N. Y.
River Valley Tissue Mills, Inc., Phoenix, N. Y.
Robertson Co., The, Hinsdale, N. H.
Robertson, G. E. & Co., Hinsdale, N. H.
Rondout Paper Mills, Inc., Napanoch, N. Y.
Rushmore Paper Mills, Inc., Natural Dam, N. Y.
Russell Products Co., Phila., Pa.
Sanitary Paper Mills, Inc., East Hartford, Conn.
Senoso Paper Co., Inc., Phoenix, N. Y.
Smith Paper, Inc., Lee, Mass.
Southern Waxed Paper Co., Atlanta, Ga.
Stevens & Thompson Paper Co., Inc., Greenwich, N. Y.
Sweet Bros. Paper Mfg. Co., Phoenix, N Y..
Thilmany Pulp & Paper Co., Kaukauna, Wis.
Tissue Co., Saugerties, N. Y.
Tuttle Press Co., The, Appleton, Wis.
Twitchell, E. W. Inc., Pkg. Div., Phila., Pa.
Victoria Paper Mills Co., Fulton, N. Y.
Waterproof Paper & Board Co., Cincinnati, Ohio
Weber Supply Co., Momence, Ill.
White River Paper Mills, Inc., Indianapolis, Ind.
White-Washburn Co., Inc., Hinsdale, N. H.
Williams, Chas. W. & Co., Inc., New York, N. Y.
Wisconsin Tissue Mills, Menasha, Wis.

PAPER, TRADEMARKED

Aldine Paper Co., New York, N. Y.
Blake, Moffitt & Towne, San Francisco, Calif.
Bradner Smith & Co., Chicago, Ill.
Decotone Products, Div. Fitchburg Paper Co., Fitchburg, Mass.
Dejonge, Louis & Co., New York, N. Y.
District of Columbia Paper Mills, Inc., Washington, D. C.
Dobeckmun Co., The, Cleveland, Ohio
Fitchburg Paper Co., Fitchburg, Mass.
Hampden Glazed Paper & Card Co., Holyoke, Mass.
Hazen Paper Co., Holyoke, Mass.
Holyoke Card & Paper Co., Springfield, Mass.
Hughes & Hoffman, New York, N. Y.
Kupfer Bros. Paper Co., New York, N. Y.
Marvellum Co., The, Holyoke, Mass.
Matthias Paper Corp., Phila., Pa.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
Pejepscot Paper Co., New York, N. Y.
Plastic Coating Corp., Holyoke, Mass.
Racquette River Paper Co., Potsdam, N. Y.
Royal Paper Corp., New York, N. Y.
Shellmar Products Co., Mt. Vernon, Ohio
Springfield Coated Paper Corp., Camden, N. J.
Sylvania Industrial Corp., New York, N. Y.
Twitchell, E. W. Inc., Pkg. Div., Phila., Pa.
Westfield River Paper Co., Inc., Russell, Mass.
Williams, Chas. W. & Co., Inc., New York, N. Y.
Wyomissing Glazed Paper Co., Reading, Pa.

PAPER, VELOUR

(Plain, Printed and Embossed)

Blake, Moffitt & Towne, San Francisco, Calif.
Bradner Smith & Co., Chicago, Ill.
Cellusuede Products, Inc., Rockford, Ill.
Dejonge, Louis & Co., New York, N. Y.
District of Columbia Paper Mills, Inc., Washington, D. C.
Frann Paper Co., New York, N. Y.
Hughes & Hoffman, New York, N. Y.
Keller-Dorian Corp., New York, N. Y.
Kupfer Bros. Co., New York, N. Y.
Matthias Paper Corp., Phila., Pa.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
Tamm & Co., New York, N. Y.
Williams, Chas. W. & Co., Inc., New York, N. Y.

PAPER, WATERPROOF

Angier Corp., Framingham, Mass.
Atlantic Gummed Paper Corp., Bklyn, N. Y.
Bemis Bro. Bag Co., St. Louis, Mo.
Bradner Smith & Co., Chicago, Ill.
Central Waxed Paper Co., Chicago, Ill.
Cincinnati Industries, Inc., Cincinnati (Lockland), Ohio
Cromwell Paper Co., The, Chicago, Ill.
Decotone Products, Div. Fitchburg Paper Co., Fitchburg, Mass.
Hampden Glazed Paper & Card Co., Holyoke, Mass.
Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Marvellum Co., The, Holyoke, Mass.
Matthias Paper Corp., Phila., Pa.
McLaurin-Jones Co., Brookfield, Mass.
Middlesex Products Corp., Cambridge, Mass.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
National Water-Proofing Co., Camden, N. J.
Newark Paraffine & Parchment Paper Co., Newark, N. J.
Pyrotex Leather Co., Leominster, Mass.
Shellmar Products Co., Mt. Vernon, Ohio
Sisalkraft Co., The, Chicago, Ill.
Specialty Papers Co., The, Dayton, Ohio
Twitchell, E. W. Inc., Pkg. Div., Phila., Pa.
Union Bag & Paper Corp., New York, N. Y.
United Mfg. Co., Springfield, Mass.
Williams, Chas. W. & Co., Inc., New York, N. Y.

PAPER, WAXED

American Tissue Mills, Holyoke, Mass.
Arvey Corp., Chicago, Ill., & Jersey City, N. J.
Ben Mont Papers, Inc., Bennington, Vt.
Central Waxed Paper Co., Inc., Chicago, Ill.
Cromwell Paper Co., The, Chicago, Ill.
Crystal Tissue Co., Middletown, Ohio
Deerfield Glassine Co., Monroe Bridge, Mass.
Dixie Wax Paper Co., Inc., Dallas, Tex.
General Felt Products, Inc., Bklyn, N. Y.
Hamersley Mfg. Co., The, Garfield, N. J.
Henle Wax Paper Mfg. Co., Inc., New York, N. Y.
Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Menasha Products Co., The, Div. of Marathon Paper Mills Co., Menasha, Wis.
Milprint, Inc., Milwaukee, Wis.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
National Water-Proofing Co., Camden, N. J.

Bold-face listings indicate advertisers in this issue

Newark Paraffine & Parchment Paper Co., Newark, N. J.
Paterson Parchment Paper Co., Bristol, Pa.
Port Huron Sulphite & Paper Co., Port Huron, Mich.
Riegel Paper Corp., New York, N. Y.
Shawmut Waxed Paper Co., Holliston, Mass.
Smith, H. P. Paper Co., Chicago, Ill.
Southern Waxed Paper Co., Atlanta, Ga.
Specialty Papers Co., Dayton, Ohio
Sweetnam, George H. Inc., Cambridge, Mass.
Thilmany Pulp & Paper Co., Kaukauna, Wis.
Twitchell, E. W. Inc., Pkg. Div., Phila., Pa.
Union Bag & Paper Corp., New York, N. Y.
Waterproof Paper & Board Co., Cincinnati, Ohio
Waxed Papers, Inc., Long Island City, N. Y.

PAPER, WET STRENGTH

Decotone Products, Div. Fitchburg Paper Co., Fitchburg, Mass.
Deerfield Glassine Co., Monroe Bridge, Mass.
Dennison Mfg. Co., Framingham, Mass.
Dunn Sulphite Paper Co., Port Huron, Mich.
Gaylord Container Corp., St. Louis, Mo.
Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Matthias Paper Corp., Phila., Pa.
Newark Paraffine & Parchment Paper Co., Newark, N. J.
Riegel Paper Corp., New York, N. Y.
Sisalkraft Co., The, Chicago, Ill.
Union Bag & Paper Corp., New York, N. Y.
Warren, S. D. Co., Boston, Mass.
Westfield River Paper Co., Inc., Russell, Mass.
Williams, Chas. W. & Co., Inc., New York, N. Y.

PAPER, WOOD VENEER

(Imitation)

Aldine Paper Co., New York, N. Y.
Anderson, George W. Inc., Long Island City, N. Y.
Blake, Moffitt & Towne, San Francisco, Calif.
Bradner Smith & Co., Chicago, Ill.
Central Waxed Paper Co., Chicago, Ill.
Dejonge, Louis & Co., New York, N. Y.
District of Columbia Paper Mills, Inc., Washington, D. C.
Frann Paper Co., New York, N. Y.
Hampden Glazed Paper & Card Co., Holyoke, Mass.
Hazen Paper Co., Holyoke, Mass.
Hinkson Paper Co., Palmer, Mass.
Holyoke Card & Paper Co., Springfield, Mass.
Hughes & Hoffman, New York, N. Y.
Keller-Dorian Corp., New York, N. Y.
Kupfer Bros. Co., New York, N. Y.
Marvellum Co., The, Holyoke, Mass.
Matthias Paper Corp., Phila., Pa.
Middlesex Products Co., Cambridge, Mass.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
Paper Affiliates Co., New York, N. Y.
Racquette River Paper Co., Potsdam, N. Y.
Royal Paper Corp., New York, N. Y.
Sherman Paper Products Corp., Newton Upper Falls, Mass.
Springfield Coated Paper Corp., Camden, N. J.
Stevens-Nelson Paper Corp., The, New York, N. Y.
Tamm & Co., New York, N. Y.
United Mfg. Co., Springfield, Mass.
Williams, Chas. W. & Co., Inc., New York, N. Y.

PAPER, WRAPPING

(Fancy Tissue)

Aldine Paper Co., Inc., New York, N. Y.
American Tissue Mills, Holyoke, Mass.
Ben Mont Papers, Inc., Bennington, Vt.
Bradner Smith & Co., Chicago, Ill.
Chicago Printed String Co., Chicago, Ill.
Crown Zellerbach Corp., San Francisco, Calif.
Crystal Tissue Co., Middletown, Ohio
Decotone Products, Div. Fitchburg Paper Co., Fitchburg, Mass.
Dejonge, Louis & Co., New York, N. Y.
Dennison Mfg. Co., Framingham, Mass.
Dunn Sulphite Paper Co., Port Huron, Mich.
Du-Tone Ribbon Corp., New York, N. Y.
Hampden Glazed Paper & Card Co., Holyoke, Mass.
Hazen Paper Co., Holyoke, Mass.
Kupfer Bros. Paper Co., New York, N. Y.
Marvellum Co., The, Holyoke, Mass.
Matthias Paper Corp., Phila., Pa.
Moyer & Pratt, Inc., Lyons Falls, N. Y.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
Pejepscot Paper Co., New York, N. Y.
Port Huron Sulphite & Paper Co., Port Huron, Mich.
Rondout Paper Mills, Inc., Napanoch, N. Y.
Royal Paper Corp., New York, N. Y.
Springfield Coated Paper Corp., Camden, N. J.
Stevens-Nelson Paper Corp., The, New York, N. Y.
Twitchell, E. W. Inc., Pkg. Div., Phila., Pa.
Williams, Chas. W. & Co., Inc., New York, N. Y.

PARTITIONS

Andrews, O. B. Co., Chattanooga, Tenn.
Gaylord Container Corp., St. Louis, Mo.
Hope Paper Box Co., Providence, R. I.
Kress, F. J. Box Co., Pittsburgh, Pa.
Sherman Paper Products Corp., Newton Upper Falls, Mass.
Sweetnam, George H. Inc., Cambridge, Mass.
Traver Corp., Chicago, Ill.

PLASTIC MATERIALS, METHYL METHACRYLATE

Du Pont de Nemours, E. I. & Co., Inc., Wilmington, Del.
Rohm & Haas Co., Inc., Phila., Pa.

PLASTIC MATERIALS, CASEIN

American Plastics Corp., New York, N. Y.
Hercules Powder Co., Inc., Wilmington, Del.
Morrell, George Corp., Muskegon Heights, Mich.

PLASTIC MATERIALS, CAST PHENOL

Bakelite Corp., New York, N. Y.
Catalin Corp., New York, N. Y.
Durez Plastics & Chemicals, Inc., No. Tonawanda, N. Y.
Knoedler, A. Co., Lancaster, Pa.
Marblette Corp., Long Island City, N. Y.
Monsanto Chemical Co., Plastics Div., Springfield, Mass.

PLASTIC MATERIALS, CELLULOSE ACETATE

Bakelite Corp., New York, N. Y.
Celanese Celluloid Corp., New York, N. Y.
Du Pont de Nemours, E. I. & Co., Inc., Wilmington, Del.
Eastman Kodak Co., Rochester, N. Y.
Hercules Powder Co., Inc., Wilmington, Del.
Monsanto Chemical Co., Plastics Div., Springfield, Mass.
Nixon Nitration Works, Nixon, N. J.
Tennessee Eastman Corp., Kingsport, Tenn.

PLASTIC MATERIALS, CELLULOSE ACETATE BUTYRATE

Tennessee Eastman Corp., Kingsport, Tenn.

PLASTIC MATERIALS, CELLULOSE NITRATE, PYROXYLIN

Celanese Celluloid Corp., New York, N. Y.
Du Pont de Nemours, E. I. & Co., Inc., Wilmington, Del.
Eastman Kodak Co., Rochester, N. Y.
Hercules Powder Co., Wilmington, Del.
Monsanto Chemical Co., Plastics Div., Springfield, Mass.
Nixon Nitration Works, Nixon, N. J.

PLASTIC MATERIALS, ETHYL CELLULOSE

Celanese Celluloid Corp., New York, N. Y.
Dow Chemical Co., The, Midland, Mich.
Hercules Powder Co., Wilmington, Del.
Nixon Nitration Works, Nixon, N. J.

PLASTIC MATERIALS, MELAMINE FORMALDEHYDE

American Cyanamid Co., Plastics Div., New York, N. Y.
Catalin Corp., New York, N. Y.
Monsanto Chemical Co., Plastics Div., Springfield, Mass.
Plaskon Div., Libbey-Owens-Ford Glass Co., Toledo, Ohio

PLASTIC MATERIALS, PHENOL-FORMALDEHYDE

Bakelite Corp., New York, N. Y.
Catalin Corp., New York, N. Y.
Durez Plastics & Chemicals, Inc., N. Tonawanda, N. Y.
Durite Plastics, Inc., Phila., Pa.
Heresite & Chemicals Co., Manitowoc, Wis.
Makalot Corp., Boston, Mass.
Monsanto Chemical Co., Plastics Div., Springfield, Mass.

PLASTIC MATERIALS, PHENOL-FURFURAL

Durite Plastics, Inc., Phila., Pa.

PLASTIC MATERIALS, STYRENE

Bakelite Corp., New York, N. Y.
Catalin Corp., New York, N. Y.
Dow Chemical Co., The, Midland, Mich.
Monsanto Chemical Co., Plastics Div., Springfield, Mass.
Nixon Nitration Works, Nixon, N. J.

PLASTIC MATERIALS, UREA-FORMALDEHYDE

American Cyanamid Co., Plastics Div., New York, N. Y.
Bakelite Corp., New York, N. Y.
Makalot Corp., Boston, Mass.
Plaskon Div., Libbey-Owens-Ford Glass Co., Toledo, Ohio

PLASTIC MATERIALS, VINYLIDENE CHLORIDE

Dow Chemical Co., The, Midland, Mich.

Addresses of companies listed appear on pages 755–763

XUM

PLASTIC MATERIALS, VINYL CHLORIDE ACETATE

Carbide & Carbon Chemicals Corp., Plastics Div., New York, N. Y.
Celanese Celluloid Corp., New York, N. Y.
Du Pont de Nemours, E. I. & Co., Inc., Wilmington, Del.
Monsanto Chemical Co., Plastics Div., Springfield, Mass.
Union Carbide & Carbon Corp., New York, N. Y.

RIBBONS & TIES, COTTON

Chicago Printed String Co., Chicago, Ill.
Dennison Mfg. Co., Framingham, Mass.
Economy Novelty & Printing Co., New York, N. Y.
Fibre Cord Co., New York, N. Y.
Freydberg Bros.-Strauss, Inc., New York, N. Y.
Stark Bros. Ribbon Co., New York, N. Y.
Taffel Bros., Inc., New York, N. Y.
W-E-R Ribbon Corp., New York, N. Y.

RIBBONS & TIES, RAYON

Artistic Flower Co., New York, N. Y.
Buser, R. G. Corp., Paterson, N. J.
Century Ribbon Mills, New York, N. Y.
Du-Tone Ribbon Corp., New York, N. Y.
Fibre Cord Co., New York, N. Y.
Freydberg Bros.-Strauss, Inc., New York, N. Y.
General Ribbon Mills, Catasauqua, Pa.
Ketcham, Howard Inc., New York, N. Y.
Stark Bros. Ribbon Co., New York, N. Y.
Taffel Bros., Inc., New York, N. Y.
Welwood, John C. Corp., New York, N. Y.
W-E-R Ribbon Corp., New York, N. Y.
Wright, Wm. E. & Sons Co., West Warren, Mass.

RIBBONS & TIES, TRANSPARENT

Dennison Mfg. Co., Framingham, Mass.
Du-Tone Ribbon Corp., Chicago, Ill.
Fibre Cord Co., New York, N. Y.
Freydberg Bros.-Strauss, Inc., New York, N. Y.
Milprint, Inc., Milwaukee, Wis.
Shellmar Products Co., Mt. Vernon, Ohio
Stark Bros. Ribbon Co., New York, N. Y.
Taffel Bros., Inc., New York, N. Y.
Walser Mfg. Co., Inc., The, Clifton, N. J.
W-E-R Ribbon Corp., New York, N. Y.

ROLL LEAF, STAMPING FOIL

Coughlin Mfg. Co., New York, N. Y.
Griffin, Campbell, Hayes, Walsh, Inc., New York, N. Y.
Krause, Richard M., Inc., New York, N. Y.
Markem Machine Co., Keene, N. H.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
Peerless Roll Leaf Co., Inc., Union City, N. J.

SEALS

(Embossed on Paper, Foil, Etc.)

See also Closures, Secondary

Attleboro Printing & Embossing Co., Inc., Attleboro, Mass.
Bartlett Label Co., Kalamazoo, Mich.
Cameo Die & Label Co., New York, N. Y.
Chaspec Mfg. Co., New York, N. Y.
Chicago Printed String Co., Chicago, Ill.
Consolidated Lithographing Corp., Bklyn, N. Y.
Dennison Mfg. Co., Framingham, Mass.
Ever Ready Label Corp., New York, N. Y.
Fitzhugh, Wm. W. Inc., Bklyn, N. Y.
Foxon Co., The, Providence, R. I.
Grammes, L. F. & Sons, Inc., Allentown, Pa.
Grand Rapids Label Co., Grand Rapids, Mich.
Kaumagraph Co., Wilmington, Del.
Krause, Richard M. Inc., New York, N. Y.
Lambooy Label & Wrapper Co., Kalamazoo, Mich.
Lehmann Printing & Litho. Co., San Francisco, Calif.
Milwaukee Label & Seal Co., Milwaukee, Wis.
Muirson Label Co., Inc., Bklyn, N. Y.
Nalco, Inc., New York, N. Y.
Pacific Label Co., Los Angeles, Calif.
Peerless Roll Leaf Co., Inc., Union City, N. J.
Pollock Paper & Box Co., Dallas, Tex.
Reyburn Mfg. Co., Inc., The, Phila., Pa.
Reynolds Metals Co., Richmond, Va.
St. Louis Sticker Co., St. Louis, Mo.
Tablet & Ticket Co., The, Chicago, Ill.
Tompkins' Label Service, Phila., Pa.
Unique Printed Products Co., Inc., Terre Haute, Ind.
Wheeler-Van Label Corp., Grand Rapids, Mich.

SHEETING, TRANSPARENT RIGID

Carbide & Carbon Chemicals Corp., Plastics Div., New York, N. Y.
Celanese Celluloid Corp., New York, N. Y.
Dow Chemical Co., The, Midland, Mich.
Du Pont de Nemours, E. I. & Co., Inc., Wilmington, Del.
Eastman Kodak Co., Rochester, N. Y.
Monsanto Chemical Co., Plastics Div., Springfield, Mass.
Union Carbide & Carbon Corp., New York, N. Y.

STAPLES, WIRE

Acme Staple Co., Camden, N. J.
Acme Steel Co., Chicago, Ill.
Bates Mfg. Co., The, New York, N. Y.
Bostitch, Inc., East Greenwich, R. I.
Grammes, L. F. & Sons, Inc., Allentown, Pa.
Harris-Seybold-Potter Co., Dayton, Ohio
Heller Co., The, Cleveland, Ohio
International Staple & Machine Co., Clifton Heights, Pa.
Paslode Co., Chicago, Ill.
Signode Steel Strapping Co., Chicago, Ill.

STENCIL BOARD

(Oiled & Unoiled)

Bradley, A. J. Mfg. Co., Long Island City, N. Y.
Cromwell Paper Co., The, Chicago, Ill.
Diagraph-Bradley Stencil Machine Corp., St. Louis, Mo.
Garvey Fountain Ink & Brush Co., St. Louis, Mo.
Hewitt, C. B. & Bros., Inc., New York, N. Y.
Hummel-Ross Fibre Corp., Hopewell, Va.
Ideal Stencil Machine Co., Belleville, Ill.
Marsh Stencil Machine Co., Belleville, Ill.
Matthews, Jas. H. & Co., Pittsburgh, Pa.
Metal Marker Mfg. Co., Cleveland, Ohio
National Waterproofing Co., Camden, N. J.
Noble & Westbrook Mfg. Co., East Hartford, Conn.
O'Malley, M. J. Co., Springfield, Mass.
Schwerdtle Stamp Co., Bridgeport, Conn.

STOPPERS, RUBBER

Armstrong Cork Co., Lancaster, Pa.
United States Rubber Co., New York, N. Y.

STRAPPING, FIBRE

Acme Steel Co., Chicago, Ill.

STRAPPING, STEEL

Acme Steel Co., Chicago, Ill.
Gerrard Steel Strapping Co., Chicago, Ill.
Signode Steel Strapping Co., Chicago, Ill.
Stanley Works, The, New Britain, Conn.

STRING, PRINTED

(Plain and Decorative)

Chicago Printed String Co., Chicago, Ill.
Economy Novelty Co., New York, N. Y.
Fibre Cord Co., New York, N. Y.
Freydberg Bros.-Strauss, Inc., New York, N. Y.

TAGS

Attleboro Ptg. & Embossing Co., Inc., Attleboro, Mass.
Bradner Smith & Co., Chicago, Ill.
Cameo Die & Label Co., New York, N. Y.
Cupples-Hesse Corp., St. Louis, Mo.
Dennison Mfg. Co., Framingham, Mass.
Economy Novelty Co., New York, N. Y.
Fox, C. J. Co., The, Providence, R. I.
Kaumagraph Co., Wilmington, Del.
Pollock Paper & Box Co., Dallas, Tex.
Reyburn Mfg. Co., Inc., The, Phila., Pa.
Robinson Tag & Label Co., New York, N. Y.
Salisbury Mfg. Co., Central Falls, R. I.
Tablet & Ticket Co., The, Chicago, Ill.
Talmadge Printing Co., New York, N. Y.
Weber Addressing Machine Co., Chicago, Ill.

TAPE, CELLULOSE

Crystal Transparent Mfg. Co., Inc., New York, N. Y.
Dennison Mfg. Co., Framingham, Mass.
Fibre Cord Co., New York, N. Y.
Food Packaging Div. of Milprint, Inc., Milwaukee, Wis.
Industrial Tape Corp., New Brunswick, N. J.
International Plastics Corp., Morristown, N. J.
Minnesota Mining & Mfg. Co., St. Paul, Minn.
Sylvania Industrial Corp., New York, N. Y.
Tower Envelope Co., New York, N. Y.
Twitchell, E. W. Inc., Pkg. Div., Phila., Pa.
Walser Mfg. Co., Inc., The, Clifton, N. J.

TAPE, COTTON

Chicago Printed String Co., Chicago, Ill.
Fibre Cord Co., New York, N. Y.
Freydberg Bros.-Strauss, Inc., New York, N. Y.

TAPE, GUMMED

Atlantic Gummed Paper Corp., Bklyn, N. Y.
Blake, Moffitt & Towne, San Francisco, Calif.
Bradner Smith & Co., Chicago, Ill.
Central Paper Co., Menasha, Wis.
Chicago Gum Tape Co., Chicago, Ill.
Crowell Corp., The, Yorklyn, Del.
Crown Zellerbach Corp., San Francisco, Calif.
Dennison Mfg. Co., Framingham, Mass.
Economy Novelty Co., New York, N. Y.
Ever Ready Label Corp., New York, N. Y.
Fort Wayne Corrugated Paper Co., Fort Wayne, Ind.
Gates Paper Co. Ltd., The, Los Angeles, Calif.
Gummed Products Co., The, Troy, Ohio
Gummed Tape & Devices Co., Bklyn, N. Y.
Inland Container Corp., Indianapolis, Ind.
Knowlton, M. D. Co., Rochester, N. Y.
McLaurin-Jones Co., Brookfield, Mass.
Mid-States Gummed Paper Co., Chicago, Ill.
Nashua Gummed & Coated Paper Co., Nashua, N. H.

Nashua Package Sealing Co., Inc., Nashua, N. H.
Pollock Paper & Box Co., Dallas, Tex.
Rexford Paper Co., Milwaukee, Wis.
Reyburn Mfg. Co., Inc., The, Phila., Pa.
Twitchell, E. W. Inc., Pkg. Div., Phila., Pa.

TAPE, PRESSURE SENSITIVE

Blake, Moffitt & Towne, San Francisco, Calif.
Dennison Mfg. Co., Framingham, Mass.
Gummed Tape & Devices Co., Bklyn, N. Y.
Industrial Tape Corp., New Brunswick, N. J.
Minnesota Mining & Mfg. Co., St. Paul, Minn.
Twitchell, E. W. Inc., Pkg. Div., Phila., Pa.

TAPE, WATER RESISTANT

Atlantic Gummed Paper Corp., Bklyn, N. Y.
Blake, Moffitt & Towne, San Francisco, Calif.
Gummed Products Co., The, Troy, Ohio
Industrial Tape Corp., New Brunswick, N. J.
McLaurin-Jones Co., Brookfield, Mass.
Reynolds Metal Co., Richmond, Va.
Twitchell, E. W. Inc., Pkg. Div., Phila., Pa.

TRANSPARENT MATERIALS, CELLOPHANE

Du Pont de Nemours, E. I. & Co., Inc., Wilmington, Del.
Sylvania Industrial Corp., New York, N. Y.

TRANSPARENT MATERIALS, CELLULOSE ACETATE

American Products Mfg. Co., New Orleans, La.
Celanese Celluloid Corp., New York, N. Y.
Du Pont de Nemours, E. I. & Co., Inc., Wilmington, Del.
Eastman Kodak Co., Rochester, N. Y.
Monsanto Chemical Co., Plastics Div., Springfield, Mass.
Nixon Nitration Works, Nixon, N. J.

TRANSPARENT MATERIALS, ETHYL CELLULOSE

American Prods. Mfg. Co., New Orleans, La.
Celanese Celluloid Corp., New York, N. Y.
Dow Chemical Co., The, Midland, Mich.

TRANSPARENT MATERIALS, GLASSINE (LACQUER-COATED)

Rhinelander Paper Co., Rhinelander, Wis.
Riegel Paper Corp., New York, N. Y.
Westfield River Paper Co., Inc., Russell, Mass.

TRANSPARENT MATERIALS, LATEX FOR WRAPPING FROZEN FOODS

Dewey & Almy Chemical Co., Cambridge, Mass.

TRANSPARENT MATERIALS, RUBBER HYDROCHLORIDE

Dispersions Process, Inc., New York, N. Y.
Du Pont de Nemours, E. I. & Co., Inc., Wilmington, Del.
Goodyear Tire & Rubber Co., The, Akron, Ohio

TRANSPARENT MATERIALS, VINYL ACETATE

Carbide & Carbon Chemicals Corp., New York, N. Y.
Celanese Celluloid Corp., New York, N. Y.
Monsanto Chemical Co., Plastics Div., Springfield, Mass.

TRANSPARENT MATERIALS, VINYLIDENE CHLORIDE

Carbide & Carbon Chemicals Corp., Plastics Div., New York, N. Y.
Dow Chemical Co., The, Midland, Mich.

TUBE CLIPS

Colton, Arthur Co., Detroit, Mich.
New England Collapsible Tube Co., Chicago, Ill.
Standard Specialty & Tube Co., New Brighton, Pa.

WAX, COATING & SEALING

Bareco Oil Co., Tulsa, Okla.
Dewey & Almy Chemical Co., Cambridge, Mass.
Glyco Products Co., Inc., Bklyn, N. Y.
Nat'l. Oil Products Co., Harrison, N. J.
Petroleum Specialties, Inc., New York, N. Y.
Pyroxylin Products, Inc., Chicago, Ill.

WIRE, REINFORCEMENT

Acme Steel Co., Chicago, Ill.
Bethlehem Steel Co., Bethlehem, Pa.
Gerrard Steel Strapping Co., Chicago, Ill.
Harris-Seybold-Potter Co., Dayton, Ohio

WIRE, STAPLING

Acme Staple Co., Camden, N. J.
Acme Steel Co., Chicago, Ill.
Bates Mfg. Co., The, New York, N. Y.
Bethlehem Steel Co., Bethlehem, Pa.
Bostitch, Inc., East Greenwich, R. I.
Harris-Seybold-Potter Co., Dayton, Ohio
Heller Co., The, Cleveland, Ohio
International Staple & Machine Co., Clifton Heights, Pa.
Paslode Co., Chicago, Ill.
Prentiss, George W. & Co., Holyoke, Mass.

WIRE, STITCHING

Acme Steel Co., Chicago, Ill.
Bethlehem Steel Co., Bethlehem, Pa.
Bostitch, Inc., East Greenwich, R. I.
Dexter Folder Co., Pearl River, N. Y.
Harris-Seybold-Potter Co., Dayton, Ohio
Heller Co., The, Cleveland, Ohio
Ideal Stitcher & Mfg. Co., Racine, Wis.
International Staple & Machine Co., Clifton Heights, Pa.
Paslode Co., Chicago, Ill.
Prentiss, George W. & Co., Holyoke, Mass.

WIRE, STITCHING, COLORED

Acme Steel Co., Chicago, Ill.
Bostitch, Inc., East Greenwich, R. I.
Harris-Seybold-Potter Co., Dayton, Ohio

WRAPPINGS

Ben Mont Papers, Inc., Bennington, Vt.
Chicago Printed String Co., Chicago, Ill.
Crystal Transparent Corp., New York, N. Y.
Dobeckmun Co., The, Cleveland, Ohio
Matthias Paper Corp., Phila., Pa.
National Water-Proofing Co., Camden, N. J.
Newark Paraffine & Parchment Paper Co., Newark, N. J.
Port Huron Sulphite & Paper Co., Port Huron, Mich.
Riegel Paper Corp., New York, N. Y.
Royal, Thomas M. & Co., Phila., Pa.
Shellmar Products Co., Mt. Vernon, Ohio
Stecher-Traung Litho. Corp., Rochester, N. Y.
Twitchell, E. W. Inc., Pkg. Div., Phila., Pa

CONTAINER MANUFACTURERS SECTION

AMPOULES, GLASS

Glass Industries, Inc., New York, N. Y.
Kimble Glass Co., Vineland, N. J.
Price, M. B. Associates, New York, N. Y.
Wheaton, T. C. Co., Millville, N. J.

BAGS, ANTI-TARNISH

(Cloth and Cotton-Lined Paper)

Andrews, P. L. Corp., Bklyn, N. Y.
Bemis Bro. Bag Co., St. Louis, Mo.
Cottonluxe Mfg. Co., New York, N. Y.
Eureka Mfg. Co., Inc., Taunton, Mass.
Paramount Paper Products Co., Inc., Phila., Pa.
U. S. Envelope Co., Springfield, Mass.
Varey-Shea Bag Corp., Elizabeth, N. J.

BAGS, COMBINATION

Bemis Bro. Bag Co., St. Louis, Mo.
Betner, Benj. C. Co., Devon, Pa.
Central States Paper & Bag Co., St. Louis, Mo.
Comet Envelope & Paper Co., New York, N. Y.
Continental Bag Specialties Corp., New York, N. Y.
Crown Can Co., Phila., Pa.
Crystal Transparent Mfg. Co., Inc., New York, N. Y.
Equitable Paper Bag Co., Inc., Long Island City, N. Y.
Fulton Bag & Cotton Mills, Atlanta, Ga.
Interstate Folding Box Co., Middletown, Ohio
Mason Envelope Co., New York, N. Y.
Milprint, Inc., Milwaukee, Wis.
Oneida Paper Products, Inc., New York, N. Y.
Paramount Paper Products Co., Phila., Pa.
Reynolds Metals Co., Richmond, Va.
Royal, Thomas M. & Co., Phila., Pa.
Stecher-Traung Litho. Corp., Rochester, N. Y.
Tower Envelope Co., New York, N. Y.
Traver Corp., Chicago, Ill.
Twitchell, E. W. Inc., Pkg. Div., Phila., Pa.
Union Bag & Paper Corp., New York, N. Y.
Weber, H. G. & Co., Inc., Kiel, Wis.

BAGS, FOIL

Bemis Bro. Bag Co., St. Louis, Mo.
Continental Bag Specialties Corp., New York, N. Y.
Dobeckmun Co., The, Cleveland, Ohio
Equitable Paper Bag Co., Inc., Long Island City, N. Y.
Interstate Folding Box Co., Middletown, Ohio
Milprint, Inc., Milwaukee, Wis.
Munson Bag Co., The, Cleveland, Ohio
Neostyle, Inc., Chicago, Ill.
Oneida Paper Products, Inc., New York, N. Y.
Reynolds Metals Co., Richmond, Va.

Addresses of companies listed appear on pages 755–763

XUM

Royal, Thomas M. & Co., Phila., Pa.
Shellmar Products Co., Mt. Vernon, Ohio
Traver Corp., Chicago, Ill.
Twitchell, E. W. Inc., Pkg. Div., Phila., Pa.
Union Bag & Paper Corp., New York, N. Y.
U. S. Envelope Co., Springfield, Mass.

BAGS, GLASSINE & WAXED

American Paper Goods Co., The, Kensington, Conn.
Bemis Bro. Bag Co., St. Louis, Mo.
Ben Mont Papers Inc., Bennington, Vt.
Betner, Benj. C. Co., Devon, Pa.
Central States Paper & Bag Co., St. Louis, Mo.
Central Waxed Paper Co., Chicago, Ill.
Comet Envelope & Paper Co., Inc., New York, N. Y.
Continental Bag Specialties Corp., New York, N. Y.
Cupples-Hesse Corp., St. Louis, Mo.
Dixie Wax Paper Co., Inc., Dallas, Tex.
Equitable Paper Bag Co., Inc., Long Island City, N. Y.
Food Packaging Div. of Milprint, Inc., Milwaukee, Wis.
Herz, Alexander Co., Inc., New York, N. Y.
Interstate Folding Box Co., The, Middletown, Ohio
Mason Envelope Co., New York, N. Y.
Milprint, Inc., Milwaukee, Wis.
Moser Bag & Paper Co., The, Cleveland, Ohio
Munson Bag Co., Cleveland, O.
Neostyle, Inc., Chicago, Ill.
Newark Glassine Bag Co., Newark, N. J.
Newark Paraffine & Parchment Paper Co., Newark, N. J.
Oneida Paper Products, Inc., New York, N. Y.
Paramount Paper Products Co., Phila., Pa.
Pollock Paper & Box Co., Dallas, Tex.
Royal, Thomas M. & Co., Phila., Pa.
St. Regis Paper Co., New York, N. Y.
Schorsch & Co., Inc., New York, N. Y.
Shellmar Products Co., Mt. Vernon, Ohio
Sweetnam, Geo. H. Inc., Cambridge, Mass.
Tower Envelope Co., New York, N. Y.
Traver Corp., Chicago, Ill.
Twitchell, E. W. Inc., Pkg. Div., Phila., Pa.
Union Bag & Paper Corp., New York, N. Y.
U. S. Envelope Co., Springfield, Mass.
Wolf Bros., Phila., Pa.

BAGS, GLASSINE-LAMINATED & DUPLEX

American Paper Goods Co., The, Kensington, Conn.
Betner, Benj. C. Co., Devon, Pa.
Continental Bag Specialties Corp., New York, N. Y.
Cupples-Hesse Corp., St. Louis, Mo.
Dobeckmun Co., The, Cleveland, Ohio
Equitable Paper Bag Co., Inc., Long Island City, N. Y.
Milprint, Inc., Milwaukee, Wis.
Moser Bag & Paper Co., The, Cleveland, Ohio
Neostyle, Inc., Chicago, Ill.
Oneida Paper Products, Inc., New York, N. Y.
Paramount Paper Products Co., Phila., Pa.
Royal, Thomas M. & Co., Phila., Pa.
Schorsch & Co., Inc., New York, N. Y.
Shellmar Products Co., Mt. Vernon, Ohio
Tower Envelope Co., New York, N. Y.
Traver Corp., Chicago, Ill.
Twitchell, E. W. Inc., Pkg. Div., Philadelphia, Pa.
Union Bag & Paper Corp., New York, N. Y.
U. S. Envelope Co., Springfield, Mass.
Westfield River Paper Co., Inc., Russell, Mass.

BAGS, KRAFT, GROCERY

Arkell & Smiths, Canajoharie, N. Y.
Atlanta Paper Co., Atlanta, Ga.
Birmingham Paper Co., Birmingham, Ala.
Brooklyn Standard Bag Corp., New York, N. Y.
Consolidated Paper Bag Co., Somerville, Mass.
Crown-Willamette Paper Co., San Francisco, Calif.
Crunden, Martin Mfg. Co., St. Louis, Mo.
Cupples Co., St. Louis, Mo.
Equitable Paper Bag Co., Inc., Long Island City, N. Y.
Gaylord Container Corp., St. Louis, Mo.
Glickman, L. & Co., Bklyn, N. Y.
Interstate Bag Co., Walden, N. Y.
Kraft Bag Corp., New York, N. Y.
Lenoir Pad & Paper Co., Lenoir, N. C.
Pine-Land Bag Corp., Inc., Pascagoula, Miss.
Raymond Bag Co., Middletown, Ohio
St. Regis Paper Co., New York, N. Y.
Schorsch & Co., Inc., New York, N. Y.
Security Bag Co., The (Lockland), Cincinnati, Ohio
Seinsheimer Paper Corp., Cincinnati, Ohio
Stevens, C. E. Bros., Inc., Baltimore, Md.
Superior-Lawrence Bag Co., Inc., New York, N. Y.
Triangle Paper Bag Co., Covington, Ky.
Triangle Paper Bag Mfg. Co., Cincinnati, Ohio
Union Bag & Paper Corp., New York, N. Y.
Wortendyke Mfg. Co., Richmond, Va.

BAGS, KRAFT-LINED

Bemis Bro. Bag Co., St. Louis, Mo.
Betner, Benj. C. Co., Devon, Pa.
Continental Bag Specialties Corp., New York, N. Y.
Cromwell Paper Co., The, Chicago, Ill.
Fulton Bag & Cotton Mills, Atlanta, Ga.
Oneida Paper Products, Inc., New York, N. Y.
Royal, Thomas M. & Co., Phila., Pa.
Union Bag & Paper Corp., New York, N. Y.

BAGS, MULTIWALL HEAVY DUTY

American-National Bag & Burlap Co., Inc., Bklyn, N. Y.
Bagpak, Inc., New York, N. Y.
Bemis Bro. Bag Co., St. Louis, Mo.
Betner, Benj. C. Co., Devon, Pa.
Cromwell Paper Co., The, Chicago, Ill.
Equitable Paper Bag Co., Inc., Long Island City, N. Y.
George & Sherrard Paper Co., New York, N. Y.
Hollingsworth & Whitney Co., Boston, Mass.
International Paper Prods., Div. of International Paper Co., New York, N. Y.
Kraft Bag Corp., New York, N. Y.
Reynolds Metals Co., Richmond, Va.
St. Regis Paper Co., New York, N. Y.
Schorsch & Co., Inc., New York, N. Y.
Union Bag & Paper Corp., New York, N. Y.
Wortendyke Mfg. Co., The, Richmond, Va.

BAGS, TEXTILE

Acme Burlap Bag Co., Bklyn, N. Y.
American National Bag & Burlap Co., Inc., Bklyn. N. Y.
Ames Bag Co., Selma, Ala.
Ames Harris Neville Co., San Francisco, Calif.
Arkell Safety Bag Co., New York, N. Y.
Augusta Bag & Burlap Co., Augusta, Ga.
Bader Bros. Bag Co., Detroit, Mich.
Bannon Bag Co., The, New Orleans, La.
Bemis Bro. Bag Co., St. Louis, Mo.
Blodt Bag Co., The, Houston, Tex.
Bosworth, M. M. Co., Memphis, Tenn.
Brown & Brown, Mobile, Ala.
Burka Bag Co. of Texas, Galveston, Tex.
Central Bag & Burlap Co., Chicago, Ill.
Chase, H. & L., Boston, Mass.
Chase Bag Co., New York, N. Y.
Cincinnati Industries, Inc., Cincinnati, Ohio
Continental Bag Specialties Corp., New York, N. Y.
Cottonluxe Mfg. Co., New York, N. Y.
Crescent Burlap Bag Co., New Orleans, La.
Crystal Bag Co., Chickamauga, Ga.
Erwin Bag Co., Houston, Tex.
Eureka Mfg. Co., Inc., Taunton, Mass.
Friedman Bag Co., Los Angeles, Calif.
Fulton Bag & Cotton Mills, Atlanta, Ga.
Gallie-King Bag Co., Houston, Tex.
General Bag Corp., Cleveland, Ohio
Grafflin Bag Co., Inc., Baltimore, Md.
Grimes Co., The, Denver, Colo.
Halsted, E. S. & Co., Inc., New York, N. Y.
Hardin Bag & Burlap Co., The, New Orleans La.
Hutchinson Bag Co., Hutchinson, Kan.
Kent, Percy Bag Co., Inc., New York, N. Y.
Keystone Bag & Burlap Co., Lancaster, Pa.
King Bag Co., Cincinnati, Ohio
King Mfg. Co., Cincinnati, Ohio
Lawson, Jacob Bag Co., New York, N. Y.
Lone Star Bag & Bagging Co., Houston, Tex.
Maine Potato Bag Co., Caribou, Maine
Mente & Co., Inc., New Orleans, La.
Midland Bag, Inc., Cleveland, Ohio
Millhiser Bag Co., Richmond, Va.
Milprint, Inc., Milwaukee, Wis.
Missouri Bag Co., St. Louis, Mo.
Morgan Bros., Richmond, Va.
National Bag Corp., New York, N. Y.
Neahr, M. J. & Co., Chicago, Ill.
Noon Bag Co., Portland, Ore.
Northeastern Bag & Burlap Co., New York, N. Y.
Oneida Paper Products, Inc., New York, N. Y.
Pacific Diamond H Bag Co., San Francisco, Calif.
Premier Bag Co., Inc., Lyndhurst, N. J.
Producers Dealers Supply Co., Boston, Mass.
Progressive Bag Co., Inc., New Haven, Conn.
Sacramento Bag Mfg. Co., Sacramento, Calif.
Southern California Bag Co., Los Angeles, Calif.
Southern States Bag Co., Jacksonville, Fla.
Sprosty, Dan A. Bag Co., Baltimore, Md.
Sterling Bag Co., Bklyn, N. Y.
Tobias, Max N. Bag Co., New Orleans, La.
Twitchell, E. W. Inc., Pkg. Div., Phila., Pa.
Ullmann Bag Co., Detroit, Mich.
Varey-Shea Bag Corp., Elizabeth, N. J.
Virginia Carolina Chemical Co., Richmond, Va.
Walker Bag Co., Louisville, Ky.
Werthan Bag Corp., Nashville, Tenn.
Wertheimer Bag Co., Wilmington, N. C.
West Coast Bags, Inc., Los Angeles, Calif.
Woodward Bag Co., Augusta, Ga.

BAGS, TRANSPARENT

(Cellulosic)

American Paper Goods Co., The, Kensington, Conn.
Arvey Corp., Chicago, Ill., & Jersey City, N. J.
Central States Paper & Bag Co., St. Louis, Mo.
Comet Envelope & Paper Co., Inc., New York, N. Y.
Continental Bag Specialties Corp., New York, N. Y.
Crystal Transparent Corp., New York, N. Y.
Crystal Tube Mfg. Corp., Chicago, Ill.
Cupples-Hesse Corp., St. Louis, Mo.
Dennison Mfg. Co., Framingham, Mass.
Dobeckmun Co., The, Cleveland, Ohio

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Equitable Paper Bag Co., Inc., Long Island City, N. Y.
Food Packaging Div. of Milprint, Inc., Milwaukee, Wis.
Herz, Alexander Co., Inc., New York, N. Y.
Humitube Mfg. Co., Peoria, Ill.
Interstate Folding Box Co., Middletown, Ohio
Mason Envelope Co., New York, N. Y.
Menasha Products Co., The, Menasha, Wis.
Milprint, Inc., Milwaukee, Wis.
Modern Containers, Inc., Los Angeles, Calif.
Moser Bag & Paper Co., Cleveland, Ohio
Munson Bag Co., The, Cleveland, Ohio
Neostyle, Inc., Chicago, Ill.
Newark Glassine Bag Co., Newark, N. J.
Newark Paraffine & Parchment Paper Co., Newark, N. J.
Oneida Paper Products, Inc., New York, N. Y.
Paramount Paper Products Co., Phila., Pa.
Pollock Paper & Box Co., Dallas, Tex.
Print-A-Tube Co., Passaic, N. J.
Royal, Thomas M. & Co., Phila., Pa.
Shellmar Products Co., Mt. Vernon, Ohio
Sillcocks-Miller Co., The, South Orange, N. J.
Sweetnam, Geo. H. Inc., Cambridge, Mass.
Tower Envelope Co., New York, N. Y.
Trans-Pac Services, Inc., New York, N. Y.
Traver Corp., Chicago, Ill.
Twitchell, E. W. Inc., Pkg. Div., Phila., Pa.
Union Bag & Paper Corp., New York, N. Y.
U. S. Envelope Co., Springfield, Mass.
Visking Corp., The, Chicago, Ill.
Wolf Bros., Phila., Pa.

BAGS, WINDOW

Continental Bag Specialties Corp., New York, N. Y.
Milprint, Inc., Milwaukee, Wis.
Oneida Paper Products, Inc., New York, N. Y.
Paramount Paper Products Co., Phila., Pa.
Royal, Thomas M. & Co., Phila., Pa.
Traver Corp., Chicago, Ill.
Twitchell, E. W. Inc., Pkg. Div., Phila., Pa.
Union Bag & Paper Corp., New York, N. Y.

BAGS, WATERPROOF

Angier Corp., Framingham, Mass.
Arvey Corp., Chicago, Ill., & Jersey City, N. J.
Bemis Bro. Bag Co., St. Louis, Mo.
Central States Paper & Bag Co., St. Louis, Mo.
Continental Bag Specialities Corp., New York, N. Y.
Cromwell Paper Co., The, Chicago, Ill.
Equitable Paper Bag Co., Inc., Long Island City, N. Y.
Fulton Bag & Cotton Mills, Atlanta, Ga.
Interstate Folding Box Co., Middletown, Ohio
Milprint, Inc., Milwaukee, Wis.
Munson Bag Co., The, Cleveland, Ohio
National Water-Proofing Co., Camden, N. J.
Neostyle, Inc., Chicago, Ill.
Newark Paraffine & Parchment Paper Co., Newark, N. J.
Oneida Paper Products, Inc., New York, N. Y.
Paramount Paper Products Co., Phila., Pa.
Print-A-Tube Co., Passaic, N. J.
Reynolds Metals Co., Richmond, Va.
Royal, Thomas M. & Co., Phila., Pa.
Shellmar Products Co., Mt. Vernon, Ohio
Sisalkraft Co., The, Chicago, Ill.
Twitchell, E. W. Inc., Pkg. Div., Phila., Pa.
Union Bag & Paper Corp., New York, N. Y.
U. S. Envelope Co., Springfield, Mass.

BOTTLES, ALUMINUM

American Aluminum Ware Co., Newark, N. J.

BOTTLES, APPLIED COLOR

Anchor Hocking Glass Corp., Lancaster, Ohio
Armstrong Cork Co., Lancaster, Pa.
Ball Brothers Co., Muncie, Ind.
Braun, W. Co., Chicago, Ill.
Buck Glass Co., The, Baltimore, Md.
Carr-Lowrey Glass Co., Baltimore, Md.
Coloroid Co., Inc., Cleveland, Ohio
Glass Containers, Inc., Los Angeles, Calif.
Hazel-Atlas Glass Co., Wheeling, W. Va.
Heidt Glass Wks., Inc., Bklyn, N. Y.
Kimble Glass Co., Vineland, N. J.
Liberty Glass Co., Sapulpa, Okla.
Owens-Illinois Glass Co., Toledo, Ohio
Swindell Bros., Baltimore, Md.
Wheaton, T. C. Co., Millville, N. J.

BOTTLES, BEVERAGE

Anchor Hocking Glass Corp., Lancaster, Ohio
Armstrong Cork Co., Lancaster, Pa.
Ball Brothers Co., Muncie, Ind.
Braun, W. Co., Chicago, Ill.
Brockway Glass Co., Inc., Brockway, Pa.
Buck Glass Co., The, Baltimore, Md.
Glass Containers, Inc., Los Angeles, Calif.
Hazel-Atlas Glass Co., Wheeling, W. Va.
Liberty Glass Co., Sapulpa, Okla.
Olean Glass Co., Olean, N. Y.
Owens-Illinois Glass Co., Toledo, Ohio
Swindell Bros., Baltimore, Md.
Thatcher Mfg. Co., Elmira, N. Y.

BOTTLES, FOOD PACKING

Anchor Hocking Glass Corp., Lancaster, Ohio
Armstrong Cork Co., Lancaster, Pa.
Ball Brothers Co., Muncie, Ind.
Braun, W. Co., Chicago, Ill.
Brockway Glass Co., Inc., Brockway, Pa.
Carr-Lowrey Glass Co., Baltimore, Md.
Glass Containers, Inc., Los Angeles, Calif.
Hazel-Atlas Glass Co., Wheeling, W. Va.
Kimble Glass Co., Vineland, N. J.
Olean Glass Co., Olean, N. Y.
Owens-Illinois Glass Co., Toledo, Ohio
Thatcher Mfg. Co., Elmira, N. Y.

BOTTLES, HAND MADE

Braun, W. Co., Chicago, Ill.
Carr-Lowrey Glass Co., Baltimore, Md.
Glass Industries, Inc., New York, N. Y.
Kimble Glass Co., Vineland, N. J.
Owens-Illinois Glass Co., Toledo, Ohio
Swindell Bros., Baltimore, Md.
Wheaton, T. C. Co., Millville, N. J.

BOTTLES, MILK

Buck Glass Co., The, Baltimore, Md.
Liberty Glass Co., Sapulpa, Okla.
Owens-Illinois Glass Co., Toledo, Ohio
Thatcher Mfg. Co., Elmira, N. Y.

BOTTLES, PLASTIC

Columbus Plastic Products, Columbus, Ohio
Great American Plastics Co., Leominster, Mass.
Owens-Illinois Glass Co., Toledo, Ohio
Plax Corp., Hartford, Conn.

BOTTLES, PROPRIETARY & PRESCRIPTION

Anchor Hocking Glass Corp., Lancaster, Ohio
Armstrong Cork Co., Lancaster, Pa.
Ball Brothers Co., Muncie, Ind.
Braun, W. Co., Chicago, Ill.
Brockway Glass Co., Inc., Brockway, Pa.
Buck Glass Co., The, Baltimore, Md.
Carr-Lowrey Glass Co., Baltimore, Md.
Glass Containers, Inc., Los Angeles, Calif.
Hazel-Atlas Glass Co., Wheeling, W. Va.
Kimble Glass Co., Vineland, N. J.
Owens-Illinois Glass Co., Toledo, Ohio
Pennsylvania Glass Products Co., Pittsburgh, Pa.
Swindell Bros., Baltimore, Md.
Thatcher Mfg. Co., Elmira, N. Y.
Wheaton, T. C. Co., Millville, N. J.

BOTTLES, TOILET, PERFUME, COSMETIC

Anchor Hocking Glass Corp., Lancaster, Ohio
Armstrong Cork Co., Lancaster, Pa.
Ball Brothers Co., Muncie, Ind.
Braun, W. Co., Chicago, Ill.
Brockway Glass Co., Inc., Brockway, Pa.
Carr-Lowrey Glass Co., Baltimore, Md.
Glass Containers, Inc., Los Angeles, Calif.
Glass Industries, Inc., New York, N. Y.
Greene's Ceramic Products Co., Inc., Sebring, Ohio
Hamilton, J. T. & A. Co., Pittsburgh, Pa.
Hazel-Atlas Glass Co., Wheeling, W. Va.
Kimble Glass Co., Vineland, N. J.
Maryland Glass Corp., Baltimore, Md.
Owens-Illinois Glass Co., Toledo, Ohio
Pennsylvania Glass Products Co., Pittsburgh, Pa.
Swindell Bros., Baltimore, Md.
Trilsch, Oscar Co., Whitestone, N. Y.
Wheaton, T. C. Co., Millville, N. J.

BOXES, CORRUGATED & SOLID FIBRE

American Box Board Co., Grand Rapids, Mich.
American Coating Mills, Inc., Elkhart, Ind.
Anderson Box & Basket Co., New York, N. Y.
Andrews, O. B. Co., Chattanooga, Tenn.
Ashtabula Corrugated Box Co., The, Ashtabula, Ohio
Atlas-Boxmakers, Inc., Chicago, Ill.
Bird & Son, Inc., East Walpole, Mass.
Birmingham Paper Co., Birmingham, Ala.
Carpenter Container Corp., Bklyn, N. Y.
Columbia Paper Box Co., Washington, D. C.
Consolidated Paper Co., Monroe, Mich.
Container Corp. of America, Chicago, Ill.
Continental Container Corp., Bklyn, N. Y.
Crook Paper Box Co., Kansas City, Mo.
Eddy Paper Corp., Chicago, Ill.
Eggerss O'Flying Co., Omaha, Nebr.
Excelsior Paper Specialties Co., New York, N. Y.
Federal Container Co., Phila., Pa.
Fibreboard Products, Inc., San Francisco, Calif.
Fort Wayne Corrugated Paper Co., Fort Wayne, Ind.
Gair, Robert Co., Inc., New York, N. Y.
Gaylord Container Corp., St. Louis, Mo.
Grand City Container Corp., New York, N. Y.
Hankins Container Co., Cleveland, Ohio
Hinde & Dauch Paper Co., The, Sandusky, Ohio
Hollywood Paper Box Div., The Flintkote Co., Hollywood, Calif.
Inland Container Corp., Indianapolis, Ind.
Keystone Box Co., Pittsburgh, Pa.
Kress, F. J. Box Co., Pittsburgh, Pa.
Maryland Container Co., Baltimore, Md.
National Container Corp., Long Island City, N. Y.
National Metal Edge Box Co., Phila., Pa.
National Paper Box Co., Kansas City, Mo.
Nelson, B. F. Mfg. Co., Minneapolis, Minn.
New England Box Co., Greenfield, Mass.
Ohio Boxboard Co., The, Wadsworth, Ohio
Ottawa River Paper Co., The, Toledo, Ohio
Owens-Illinois Glass Co., Toledo, Ohio
Owens-Illinois Pacific Coast Co., San Francisco, Calif.

Addresses of companies listed appear on pages 755–763

Pollock Paper & Box Co., Dallas, Tex.
Rosner Container Co., New York, N. Y.
St. Regis Paper Co., New York, N. Y.
Schulz, A. Geo. Co., Milwaukee, Wis.
Transcontinental Container Corp., Corona, L. I., N. Y.
U. S. Corrugated Fibre Box Co., Indianapolis, Ind.
Waldorf Paper Products Co., St. Paul, Minn.

BOXES, CORRUGATED & SOLID FIBRE WITH WOODEN FRAMES

Andrews, O. B. Co., Chattanooga, Tenn.
Ashtabula Corrugated Box Co., The, Ashtabula, Ohio
Ohio Boxboard Co., The, Wadsworth, Ohio
Waldorf Paper Products Co., St. Paul, Minn.

BOXES, FANCY WOOD

Anderson Box & Basket Co., New York, N. Y.
Andrews, O. B. Co., Chattanooga, Tenn.
Arrow Mfg. Co., Inc., Hoboken, N. J.
Autokraft Box Corp., Hanover, Pa.
Birmingham Paper Co., Birmingham, Ala.
Eureka Mfg. Co., Inc., Taunton, Mass.
Harlich Mfg. Co., Mastercraft Div., Chicago, Ill.
Mele Mfg. Co., New York, N. Y.
New England Box Co., Greenfield, Mass.
Nicoll & Co., San Francisco, Calif.
Nussbaum Novelty Co., Berne, Ind.
Parfait Powder Puff Co., Inc., Chicago, Ill.
Peterson Bros., Chicago, Ill.
Pilliod Cabinet Co., The, Swanton, Ohio
Schunack, C. E. Inc., Meriden, Conn.
Smith, S. K. Co., Chicago, Ill.
Stiles, H. A. & Co., Boston, Mass.
Trilsch, Oscar Co., Whitestone, N. Y.
Warner Bros. Co., Bridgeport, Conn.

BOXES, LEATHERETTE

Apex Paper Box Corp., Chicago, Ill.
Arrow Mfg. Co., Inc., Hoboken, N. J.
Atlantic Paper Box Co., Boston, Mass.
Beggs & Graham, Phila., Pa.
Chaspec Mfg. Co., New York, N. Y.
Consolidated Box Co., Inc., Tampa, Fla.
Deisroth, W. H. Co., Inc., Phila., Pa.
Dennison Mfg. Co., Framingham, Mass.
Ehlbert Products, Chicago, Ill.
Eureka Mfg. Co., Inc., Taunton, Mass.
Farrington Mfg. Co., Boston, Mass.
Fleisig, H. Inc., New York, N. Y.
Globe Paper Box Mfg. Co., St. Paul, Minn.
Harlich Mfg. Co., Mastercraft Div., Chicago, Ill.
Howell, F. M. & Co., Elmira, N. Y.
Jones, Jesse Paper Box Co., Philadelphia, Pa.
Livingston & Co., Inc., New York, N. Y.
Leominster Paper Box Co., Leominster, Mass.
Lindley Box & Paper Co., Marion, Ind.
Lorscheider-Schang Co., Inc., The, Rochester, N. Y.
Mason Box Co., The, Attleboro Falls, Mass.
National Paper Box Co., Kansas City, Mo.
Neumann, Robert Co., The, Cincinnati, Ohio
Old Dominion Box Co., Charlotte, N. C.
Pictorial Paper Package Corp., Aurora, Ill.
Pilliod Cabinet Co., The, Swanton, Ohio
Schmidt, Henry & Bro., Inc., Phila., Pa.
Schulz, A. Geo. Co., Milwaukee, Wis.
Schunak, C. E., Inc., Meriden, Conn.
Smith, S. K. Co., Chicago, Ill.
Star Case Co., The, New York, N. Y.
Trilsch, Oscar Co., Whitestone, N. Y.
Universal Jewelry Case Co., Chicopee, Mass.
Warner Bros. Co., The, Bridgeport, Conn.
Weinman Bros., Chicago, Ill.

BOXES, MAILING

American Package Co., New York, N. Y.
Barger Box Co., Inc., Elkhart, Ind.
Beggs & Graham, Phila., Pa.
Brooks & Porter, Inc., New York, N. Y.
Calumet Carton Co., Harvey, Ill.
Campbell Box & Tag Co., South Bend, Ind.
Casco Paper Box Co., Inc., Portland, Me.
Clover Paper & Transparent Boxes, New York, N. Y.
Columbia Paper Box Co., Washington, D. C.
Crook Paper Box Co., Kansas City, Mo.
Cross Paper Products Corp., New York, N. Y.
Deisroth, W. H. Co., Inc., Phila., Pa.
Delman Paper Box Co., The, Cincinnati, Ohio
Electric City Box Co., Buffalo, N. Y.
Estes, E. B. & Sons, Inc., New York, N. Y.
Fibreboard Products, Inc., San Francisco, Calif.
Flashfold Box Corp., Ft. Wayne, Ind.
Fleishhacker Paper Box Co., San Francisco, Calif.
Fleisig, H. Inc., New York, N. Y.
Fox, C. J. Co., The, Providence, R. I.
Frankenberg Bros., Inc., Columbus, Ohio
Friend Box Co., Danvers, Mass.
Gair, Robert Co., Inc., New York, N. Y.
Gardner-Richardson Co., The, Middletown, Ohio
Gates Paper Co., Ltd., The, Los Angeles, Calif.
Gereke-Allen Carton Co., St. Louis, Mo.
Henry, Ira L. Co., Watertown, Wis.
Hinde & Dauch Paper Co., Sandusky, Ohio
Hope Paper Box Co., Providence, R. I.
Howell, F. M. & Co., Elmira, N. Y.
Indianapolis Paper Container Co., Indianapolis, Ind.
International Mailing Tube & Wrapper Co., Long Island City, N. Y.
Kalamazoo Paper Box Co., Kalamazoo, Mich.
Keystone Box Co., Pittsburgh, Pa.
Kiernan-Hughes Co., Jersey City, N. J.
Lengsfield Bros., Inc., New Orleans, La.
Lindley Box & Paper Co., Marion, Ind.
Livingston & Co., Inc., New York, N. Y.
Mason Box Co., The, Attleboro Falls, Mass.
Michigan Carton Co., Battle Creek, Mich.
Miller, Walter P. Co., Inc., Phila., Pa.
Myers, J. & P. B. Inc., Jersey City, N. J.
National Folding Box Co., New Haven, Conn.
National Metal Edge Box Co., Phila., Pa.
National Paper Box Co., Kansas City, Mo.
Nelson, B. F. Mfg. Co., Minneapolis, Minn.
Neumann, Robert Co., The, Cincinnati, Ohio
Ohio Boxboard Co., The, Wadsworth, Ohio
Old Dominion Box Co., Charlotte, N. C.
Paper Package Co., Indianapolis, Ind.
Pharmacy Paper Box Co., Chicago, Ill.
Pictorial Paper Package Corp., Aurora, Ill.
Pohlig Bros., Richmond, Va.
Pollock Paper & Box Co., Dallas, Tex.
Ritchie, W. C. & Co., Chicago, Ill.
Rudnic, A. & A. Inc., New York, N. Y.
Schmidt, Henry & Bro., Inc., Phila., Pa.
Schoettle, Edwin J. Co., Phila., Pa.
Schulz, A. Geo. Co., Milwaukee, Wis.
Schunak, C. E. Inc., Meriden, Conn.
Seaman Box Co., Inc., New York, N. Y.
Sears, Merle Paper Box Co., Danville, Ill.
Shampain, Citron, Clark, Inc., Bklyn, N. Y.
Shoup-Owens, Inc., Hoboken, N. J.
Shuttleworth Carton Co., Inc., New York, N. Y.
Simplex Paper Box Corp., Lancaster, Pa.
Stein, A. & Co., Chicago, Ill.
Sutherland Paper Co., Kalamazoo, Mich.
Taylor Box Co., Providence, R. I.
Thoma Paper Box Co., Inc., Buffalo, N. Y.
Universal Jewelry Case Co., Chicopee, Mass.
Waldorf Paper Products Co., St. Paul, Minn.
Warner Brothers Co., The, Bridgeport, Conn.
Wilkata Folding Box Co., The, Kearney, N. J.
Wilkins Paper Box Co., Inc., Boston, Mass.
Wilson Paper Box Co., Inc., Richmond, Va.
Wolverine Carton Co., Grand Rapids, Mich.
Young, Douglas Inc., Pawtucket, R. I.
Young, Everett Co., Providence, R. I.

BOXES, METAL, COVERED
(Fabric, Leatherette, Etc.)

Arrow Mfg. Co., Inc., Hoboken, N. J.
Eureka Mfg. Co., Inc., Taunton, Mass.
Farrington Mfg. Co., Boston, Mass.
Grammes, L. F. & Sons, Inc., Allentown, Pa.
Harlich Mfg. Co., Mastercraft Div., Chicago, Ill.
Hudson, H. L. Co., The, Bklyn, N. Y.
National Paper Box Co., Kansas City, Mo.
Reynolds Metals Co., Richmond, Va.
Seaman Box Co., Inc., New York, N. Y.
Smith, S. K. Co., Chicago, Ill.

BOXES, METAL EDGE

Fleishhacker Paper Box Co., San Francisco, Calif.
Hollywood Paper Box Div., The Flintkote Co., Hollywood, Calif.
National Metal Edge Box Co., Phila., Pa.
Seaman Box Co., Inc., New York, N. Y.

BOXES, METAL SPECIALTIES
(For Mascara, Cosmetics, Compacts, Etc.)

Advertising Metal Display Co., Chicago, Ill.
Aluminum Co. of America, Pittsburgh, Pa.
Aluminum Container Corp., Fulton, N. Y.
American Aluminum Ware Co., Newark, N. J.
Beggs & Graham, Phila., Pa.
Bridgeport Metal Goods Mfg. Co., Bridgeport, Conn.
Clark, J. L. Mfg. Co., Rockford, Ill.
Crown Can Co., Phila., Pa.
Ellis, George D. & Sons, Inc., Phila., Pa.
Farrington Mfg. Co., Boston, Mass.
Grammes, L. F. & Sons, Inc., Allentown, Pa.
Gutmann, Ferdinand & Co., Bklyn, N. Y.
Harlich Mfg. Co., Mastercraft Div., Chicago, Ill.
Hudson, H. L. Co., The, Bklyn, N. Y.
Majestic Metal Specialties, Inc., New York, N. Y.
Reynolds Metals Co., Richmond, Va.
Scovill Mfg. Co., Waterbury, Conn.
Seymour Products Co., The, Seymour, Conn.
Smith, S. K. Co., Chicago, Ill.

BOXES, PAPER SET-UP

Acme Paper Box Co., Chicago, Ill.
Alder, H. M. & Co., Baltimore, Md.
Alderman Paper Box Corp., Rochester, N. Y.
American Package Co., New York, N. Y.
American Tri-State Paper Box Co., Nashville, Tenn.
Angelus Paper Box Corp., Los Angeles, Calif.
Apex Paper Box Corp., Chicago, Ill.
Arvey Corp., Chicago, Ill., & Jersey City, N. J.
Atlanta Box Factory, Inc., Atlanta, Ga.
Atlantic Carton Corp., Norwich, Conn.
Atlantic Paper Box Co., Boston, Mass.
Atlantic Paper Box Corp., The, Jersey City, N. J.
Atlas-Boxmakers, Inc., Chicago, Ill.
Atlas Paper Box Co., Chattanooga, Tenn.
Babcock, A. H. Co., The, Attleboro, Mass.
Baldwin, Eli & Son, Inc., New York, N. Y.
Bangor Box Co., Bangor, Me.
Barger Box Co., Inc., Elkhart, Ind.

Beggs & Graham, Phila., Pa.
Bicknell & Fuller Paper Box Co., Boston, Mass.
Bierdeman Paper Box Co., The, Chicago, Ill.
Bird & Son, Inc., East Walpole, Mass.
Birmingham Paper Co., Birmingham, Ala.
Bisler, G. A. Inc., Phila., Pa.
Bloomer Bros. Co., Newark, New York State
Brick & Ballerstein, New York, N. Y.
Bridgeport Paper Box Co., Bridgeport, Conn.
Brooks & Porter, Inc., New York, N. Y.
Buedingen, Ferdinand Co., Inc., Rochester, N. Y.
Buffington, F. H. Co., Providence, R. I.
Burnett, R. L. Co., San Antonio, Texas
Burt, F. N. Co., Inc., Buffalo, N. Y.
Cambridge Paper Box Co., Cambridge, Mass.
Capitol Paper Box Co., Inc., No. Bergen, N. J.
Carter, Wm. Co., Needham Heights, Mass.
Casco Paper Box Co., Inc., Portland, Me.
Casselman, T. & E. Inc., New York, N. Y.
Central Paper Box Co., Kansas City, Mo.
Central States Paper & Bag Co., St. Louis, Mo.
Claff, M. B. & Sons, Inc., Randolph, Mass.
Clark, B. Co., The, Danbury, Conn.
Clover Paper & Transparent Boxes, New York, N. Y.
Columbia Paper Box Co., Washington, D. C.
Columbus Paper Box Co., Inc., Columbus, Ohio
Compressed Paper Box Corp., Bridgeport, Conn.
Consolidated Box Co., Inc., Tampa, Fla.
Consolidated Paper Box Co., Somerville, Mass.
Container Corp. of America, Chicago, Ill.
Crompton-Adelphia, John Corp., Phila., Pa.
Crook Paper Box Co., No. Kansas City, Mo.
Danbury Square Box Co., The, Danbury, Conn.
Datz Mfg. Co., Phila., Pa.
Deisroth, W. H. Co., Inc., Phila., Pa.
Delman Paper Box Co., The, Cincinnati, Ohio
Delta Paper Boxes, Inc., New York, N. Y.
Dennison Mfg. Co., Framingham, Mass.
Dickerman Box Co., Cambridge, Mass.
Dix, J. J. Inc., New York, N. Y.
Dodge Paper Box Co., Leominster, Mass.
Dorfman, A. Co., Inc., New York, N. Y.
Driggs Paper Products Corp., Brooklyn, N. Y.
Eagle Paper Box Co., Detroit, Mich.
Eagle Paper Box Co., New York, N. Y.
Eagle Paper Box Mfg. Co., Chicago, Ill.
Earlville Paper Box Co., Earlville, N. Y.
Eggerss O'Flyng Co., Omaha, Nebr.
Ellis, Geo. D. & Sons, Inc., Phila., Pa.
Eureka Paper Box Corp., Chicago, Ill.
Fairchild, E. E. Corp., Rochester, N. Y.
Fibreboard Products, Inc., San Francisco, Calif.
Fleishhacker Paper Box Co., San Francisco, Calif.
Fleisig, H. Inc., New York, N. Y.
Flour City Paper Box Co., Minneapolis, Minn.
Flower City Specialty Co., Rochester, N. Y.
Foster & Cross, Inc., Bklyn, N. Y.
Frankenberg Bros., Inc., Columbus, Ohio
Friend Box Co., Danvers, Mass.
Futuristic Paper Box Co., Inc. Bklyn, N. Y.
Garfield Box Co., Clifton, N. J.
Gerbereux, Dufft & Kinder, New York, N. Y.
Globe Paper Box Mfg. Co., St. Paul, Minn.
Gordon-Lavin Paper Box Co., Inc., Baltimore, Md.
Grand Rapids Paper Box Co., Grand Rapids, Mich.
Great Lakes Box Co., The, Cleveland, Ohio
Green Bros., Inc., E. Providence, R. I.
Greenfield Paper Box Co., Greenfield, Mass.
Hashagen Paper Box Co., Washington, D. C.
Hess & Densen, New York, N. Y.
Henry, Ira L. Co., Watertown, Wis.
Heywood Mfg. Co., Minneapolis, Minn.
Hickory Paper Box Co., Hickory, N. C.
High Point Paper Box Co., Inc., High Point, N. C.
Hoague-Sprague Corp., Lynn, Mass.
Hollywood Paper Box Div., The Flintkote Co., Hollywood, Calif.
Hope Paper Box Co., Providence, R. I.
Howell, F. M. & Co., Elmira, N. Y.
Illinois Paper Box Co., Chicago, Ill.
Imperial Paper Box Co., Bklyn, N. Y.
Indianapolis Paper Container Co., Indianapolis, Ind.
Jones, Jesse Paper Box Co., Phila., Pa.
Kalamazoo Paper Box Co., Kalamazoo, Mich.
Kentucky Paper Box Co., Louisville, Ky.
Keystone Box Co., Pittsburgh, Pa.
Kiernan-Hughes Co., Jersey City, N. J.
Klein, A. & Co., Inc., New York, N. Y.
Koehl, Wm. Co., The, Cincinnati, Ohio
Kroeck Paper Box Co., Chicago, Ill.
L-A Paper Box Factory, Los Angeles, Calif.
Lebanon Paper Box Co., Lebanon, Pa.
Lengsfield Bros., Inc., New Orleans, La.
Leominster Paper Box Co., Leominster, Mass.
Livingston & Co., Inc., New York, N. Y.
Lorscheider-Schang Co., Rochester, N. Y.
Maderite Paper Box Co., Winsted, Conn.
Makowsky, J. Corp., New York, N. Y.
Maryland Paper Box Co., Baltimore, Md.
Mason Box Co., The, Attleboro Falls, Mass.
Master Craftsmen of the Set-Up Paper Box Industry, Phila., Pa.
McClintock Corp., The, Harrisburg, Pa.
Meyer, Frank C. Co., Inc., Bklyn, N. Y.
Miller, Walter P. Co., Inc., Phila., Pa.
Milprint, Inc., Milwaukee, Wis.
Minkoff & Rosenfield Bros., Inc., Bklyn, N. Y.
Molitor Box Co., Milwaukee, Wis.
Mooney & Mooney, Inc., Newark, N. J.
Moser Paper Box Co., St. Louis, Mo.
National Metal Edge Box Co., Phila., Pa.
National Paper Box Co., Kansas City, Mo.
Neumann, Robert Co., Cincinnati, Ohio
Newark Paper Box Co., Newark, N. J.
Newton Carton, Newark, N. J.
North State Paper Box Co., Statesville, N. C.
Old Dominion Box Co., Charlotte, N. C.
Old Dominion Box Co., Inc., Lynchberg, Va.
Paper Package Co., Indianapolis, Ind.
Perfumers & Jewelers Box Co., New York, N. Y.
Pharmacy Paper Box Co., Chicago, Ill.
Pictorial Paper Package Corp., Aurora, Ill.
Plumly, Eugene K. Co., Phila., Pa.
Plumly, Geo. W. Co., Inc., Phila., Pa.
Pohlig Bros., Richmond, Va.
Pollock Paper & Box Co., Dallas, Tex.
Quality Park Box Co., St. Paul, Minn.
Quincy Paper Box Co., Quincy, Ill.
Randolph Paper Box Co., The, Richmond, Va.
Ritchie, W. C. & Co., Chicago, Ill.
Rock City Paper Box Co., Inc., Nashville, Tenn.
Rogers, Edward H. Inc., New York, N. Y.
Rossotti Lithographing Co., Inc., North Bergen, N. J.
Rowell, E. N. Co., Inc., Batavia, N. Y.
Rubin, Jos. & Sons, Inc., Bklyn, N. Y.
Rudnick, A. & A. Inc., New York, N. Y.
Scandore Paper Box Co., Bklyn, N. Y.
Schleicher, F. J. Paper Box Co., St. Louis, Mo.
Schmeer's Paper Box Co., Inc., Syracuse, N. Y.
Schmidt, Henry & Bro., Inc., Phila., Pa.
Schoettle, Edwin J. Co., Phila., Pa.
Schulz, A. Geo. Co., Milwaukee, Wis.
Schunak, C. E. Inc., Meriden, Conn.
Schurmann, F. A. Inc., Bklyn, N. Y.
Scott & McDonald, Inc., Everett, Mass.
Seaman Box Co., Inc., New York, N. Y.
Sears, Merle Paper Box Co., Danville, Ill.
Seeley Tube & Box Co., Newark, N. J.
Service Paper Box Co., St. Louis, Mo.
Shampain, Citron, Clark, Inc., Bklyn, N. Y.
Shaw Paper Box Co., Meriden, Conn.
Shaw Paper Box Co., Pawtucket, R. I.
Shawprint, Inc., Lowell, Mass.
Shomer-Majestic Box Corp., New York, N. Y.
Shoup-Owens, Inc., Hoboken, N. J.
Simplex Paper Box Corp., Lancaster, Pa.
Slichter Box Co., Inc., Monnton, Pa.
Smith-Lustig Paper Box Mfg. Co., The, Cleveland, Ohio
Snyder, Geo. H. Inc., Phila., Pa.
Specialty Paper Box Co., Bklyn, N. Y.
Stein, A. & Co., Chicago, Ill.
Sterling-Wasser Box Co., Homestead, Pa.
Sterrett, D. B. Co., Bklyn, N. Y.
Strouse, Adler Co., The, New Haven, Conn.
Taylor Box Co., Providence, R. I.
Terre Paper Box Co., Chicago, Ill.
Thoma Paper Box Co., Inc., Buffalo, N. Y.
Trilsch, Oscar Co., Whitestone, N. Y.
Trum, E. J. Inc., Bklyn, N. Y.
Union Paper Box Mfg. Co., No. Seattle, Wash.
United Paper Box Co., Chicago, Ill.
Universal-Engel Paper Box Mfg. Co., Inc., St. Louis, Mo.
Universal Jewelry Case Co., Chicopee, Mass.
Utica Box Co., Inc., Utica, N. Y.
Van Ness Bros., Inc., Paterson, N. J.
Voss Karl Corp., Hoboken, N. J.
Wallace Paper Box Corp., New York, N. Y.
Warneke Paper Box Co., Denver, Colo.
Warner Bros. Co., The, Bridgeport, Conn.
Waterbury Paper Box Co., Waterbury, Conn.
Whitney & Co., Leominster, Mass.
Wilkens Paper Box Co., Inc., Boston, Mass.
Wilson Paper Box Co., Richmond, Va.
Wolfsheim & Sachs Co., New York, N. Y.
Young, Douglas Inc., Pawtucket, R. I.
Young, Everett Co., Providence, R. I.
Youse, C. J. Co., The, Baltimore, Md.
Zumbiel, C. W. Co., The, Norwood, Ohio

BOXES, TIN LITHOGRAPHED

Aluminum Container Corp., Fulton, N. Y.
American Can Co., New York, N. Y.
Bertels Metal Ware Co., Kingston, Pa.
Burdick & Son, Albany, N. Y.
Cans, Inc., Chicago, Ill.
Clark, Geo. V. Co., Inc., Long Island City, N. Y.
Clark, J. L. Mfg. Co., Rockford, Ill.
Columbia Specialty Co., Inc., Baltimore, Md.
Continental Can Co., New York, N. Y.
Crown Can Co., Phila., Pa.
Ellis, Geo. D. & Sons, Inc., Phila., Pa.
Federal Tin Co., Inc., Baltimore, Md.
Fein's Tin Can Co., Inc., Bklyn, N. Y.
Grammes, L. F. & Sons, Inc., Allentown, Pa.
Heekin Can Co., Cincinnati, Ohio
Hudson, H. L., Co., The, New York, N. Y.
Independent Can Co., Baltimore, Md.
Liberty Can & Sign Co., Lancaster, Pa.
Litho Can Corp., Camden, N. J.
Mason Can Co., Providence, R. I.
National Can Corp., New York, N. Y.
Owens-Illinois Can Co., Toledo, Ohio
Pacific Can Co., San Francisco, Calif.
Purepac Corp., New York, N. Y.
Seymour Products Co., The, Seymour, Conn.
Stuber & Kuck Co., Peoria, Ill.
Western Can Co., San Francisco, Calif.

BOXES & BASKETS, FRUIT & VEGETABLE

Andrews, O. B. Co., Chattanooga, Tenn.

Addresses of companies listed appear on pages 755–763

Ashtabula Corrugated Box Co., The, Ashtubula, Ohio
Container Corp. of America, Chicago, Ill.
Gair, Robert Co., Inc., New York, N. Y.
Gaylord Container Corp., St. Louis, Mo.
Hinde & Dauch Paper Co., Sandusky, Ohio
Inland Container Corp., Indianapolis, Ind.
Ohio Boxboard Co., The, Wadsworth, Ohio
Schoettle, Edwin J. Co., Phila., Pa.
Sutherland Paper Co., Kalamazoo, Mich.
Waldorf Paper Products Co., St. Paul, Minn.

CADDIES, CRACKERS

Ace Carton Corp., Cicero, Ill.
American Can Co., New York, N. Y.
Andrews, O. B. Co., Chattanooga, Tenn.
Central States Paper & Bag Co., St. Louis, Mo.
Consolidated Paper Co., Monroe, Mich.
Crook Paper Box Co., Kansas City, Mo.
Crown Can Co., Phila., Pa.
Densen-Banner Co., Ridgefield Park, N. J.
Empire Box Corp., Garfield, N. J.
Fibreboard Products, Inc., San Francisco, Calif.
Gair, Robert Co., Inc., New York, N. Y.
Gardner-Richardson Co., Middletown, Ohio
Gaylord Container Corp., St. Louis, Mo.
Hinde & Dauch Paper Co., Sandusky, Ohio
Hollywood Paper Box Div., The Flintkote Co., Hollywood, Calif.
Inland Container Corp., Indianapolis, Ind.
Interstate Folding Box Co., Middletown, Ohio
Lengsfield Bros., Inc., New Orleans, La.
Morris Paper Mills, Chicago, Ill.
National Can Corp., New York, N. Y.
Pohlig Bros., Richmond, Va.
Pollock Paper & Box Co., Dallas, Tex.
Schoettle, Edwin J. Co., Phila., Pa.
Schulz, A. Geo. Co., Milwaukee, Wis.
Sutherland Paper Co., Kalamazoo, Mich.
Texas Paper Box Mfg. Co., Dallas, Tex.
Transparent Specialties Corp., Cleveland, Ohio
Traver Corp., Chicago, Ill.
Waldorf Paper Products Co., St. Paul, Minn.
Warner Bros. Co., The, Bridgeport, Conn.
Wolverine Carton Co., Grand Rapids, Mich.

CANS, FIBRE

American Can Co., New York, N. Y.
Burt, F. N. Co., Inc., Buffalo, N. Y.
Cambridge Paper Box Co., Cambridge, Mass.
Canister Co., The, Phillipsburg, N. J.
Central Paper Box Co., Kansas City, Mo.
Cin-Made Co., Inc., The, Cincinnati, Ohio
Clark, Geo. V. Co., Inc., Long Island City, N. Y.
Cleveland Container Co., The, Cleveland, Ohio
Consolidated Box Co., Inc., Tampa, Fla.
Continental Can Co., Inc., New York, N. Y.
Eggerss-O'Flyng Co., Omaha, Nebr.
Fibreboard Products, Inc., San Francisco, Calif.
Gardner-Richardson Co., Middletown, Ohio
Gates Paper Co., Ltd., Los Angeles, Calif.
Indianapolis Paper Container Co., Indianapolis, Ind.
Menasha Products Co., The, Div. Marathon Paper Mills, Menasha, Wis.
National Paper Box Co., Kansas City, Mo.
Niemand Bros., Inc., Long Island City, N. Y.
Pictorial Paper Package Corp., Aurora, Ill.
Platt Corp., Baltimore, Md.
Purepac Corp., New York, N. Y.
Randolph Paper Box Co., Richmond, Va.
R. C. Can Co., St. Louis, Mo.
Ritchie, W. C. & Co., Chicago, Ill.
Sealright Co., Inc., The, Fulton, N. Y.
Sefton Fibre Can Co., St. Louis, Mo.
Shoup-Owens, Inc., Hoboken, N. J.
Sonoco Products Co., Hartsville, S. C.
Sutherland Paper Co., Kalamazoo, Mich.
Waldorf Paper Products Co., St. Paul, Minn.
Waterbury Paper Box Co., The, Waterbury, Conn.
Young, Everett Co., Providence, R. I.

CANS, FIBRE, IMPREGNATED

Cambridge Paper Box Co., Cambridge, Mass.
Clark, Geo. V. Co., Inc., Long Island City, N. Y.
Niemand Bros., Inc., Long Island City, N. Y.
Sefton Fibre Can Co., St. Louis, Mo.
Sutherland Paper Co., Kalamazoo, Mich.

CANS, PAPER
(For Bulk Ice Cream)

Menasha Products Co., The, Div. Marathon Paper Mills, Menasha, Wis.
Morris Paper Mills, Chicago, Ill.
National Folding Box Co., New Haven, Conn.
Sealright Co., Inc., The, Fulton, N. Y.
Sutherland Paper Co., Kalamazoo, Mich.

CANS, RIGID TRANSPARENT

Cambridge Paper Box Co., Cambridge, Mass.
Celanese Celluloid Corp., New York, N. Y.
Celluplastic Corp., Newark, N. J.
Central States Paper & Bag Co., St. Louis, Mo.
Cin-Made Corp., The, Cincinnati, Ohio
Clark, Geo. V. Co., Inc., Long Island City, N. Y.
Cleveland Container Co., The, Cleveland, Ohio
Fleishhacker Paper Box Co., San Francisco, Calif.
Henry, Ira, L. Co., Watertown, Wis.
Levy, Maurice, New York, N. Y.
Neostyle, Inc., Chicago, Ill.
Ritchie, W. C. & Co., Chicago, Ill.
Seaman Box Co., Inc., New York, N. Y.
Shaw Paper Box Co., Pawtucket, R. I.
Sillcocks-Miller Co., The, South Orange, N. J.
Transparent Specialties Corp., Cleveland, Ohio
Weinman Bros., Chicago, Ill.

CANS, TIN

American Can Co., New York, N. Y.
Armstrong Paint & Varnish Works, Chicago, Ill.
Arwood Can Co., Knoxville, Tenn.
Bedford Can Co., Bklyn, N. Y.
Belleville Can Co., Belleville, N. J.
Bertels Metal Ware Co., Inc., Kingston, Pa.
Buckeye Stamping Co., Columbus, Ohio
Burdick & Son, Albany, N. Y.
Bushwick Can Co., Inc., Bklyn, N. Y.
Cadillac Can Co., Mt. Clemens, Mich.
Cans, Inc., Chicago, Ill.
Central Can Co., Chicago, Ill.
Central Can Co., Inc., Kansas City, Mo.
Chesapeake Can Co., Inc., Crisfield, Md.
Clark, Geo. V. Co., Inc., Long Island City, N. Y.
Clark, J. L. Mfg. Co., Rockford, Ill.
Clarke Can Co., Phila., Pa.
Columbia Specialty Co., Inc., Baltimore, Md.
Conneaut Can Co., The, Conneaut, Ohio
Continental Can Co., Inc., New York, N. Y.
Cordiano Can Co., Inc., Bklyn, N. Y.
Crown Can Co., Phila., Pa.
Davies Can Co., The, Cleveland, Ohio
Eagle Can Co., Somerville, Mass.
Eastern Can Co., Inc., Bklyn, N. Y.
Ellis, Geo. D. & Sons, Inc., Phila., Pa.
Empire Can Corp., Bklyn, N. Y.
Federal Tin Co., Inc., Baltimore, Md.
Fein's Tin Can Co., Inc., Bklyn, N. Y.
General Can Co., Chicago, Ill.
Grand Sheet Metal Works, Chicago, Ill.
Grimely, Frank J., San Francisco, Calif.
Heekin Can Co., Cincinnati, Ohio
Hudson, H. L. Co., Bklyn, N. Y.
Independent Can Co., Baltimore, Md.
LeComte & Co., Inc., Bklyn, N. Y.
Liberty Can & Sign Co., Lancaster, Pa.
Lincoln Can Mfg. Corp., Bklyn, N. Y.
Litho Can Corp., Camden, N. J.
Manufacturers Can Co., Chicago, Ill.
Mason Can Co., Providence, R. I.
Melvina Can Co., Maspeth, L. I., N. Y.
Milton, Geo. A. Can Co., Inc., Bklyn, N. Y.
National Can Corp., New York, N. Y.
National Tin Can Mfg. Co., New York, N. Y.
New Can Co., Inc., The, Malden, Mass.
Olive Can Co., Chicago, Ill.
Owens-Illinois Can Co., Toledo, Ohio
Pacific Can Co., San Francisco, Calif.
Phelps Can Co., Baltimore, Md.
Philadelphia Can Co., Phila., Pa.
Platt Corp., Baltimore, Md.
Purepac Corp., New York, N. Y.
Robertson Can Co., Springfield, Ohio
Sexton Can Co., Inc., Everett, Mass.
Standard Can Co., Chicago, Ill.
Steel & Tin Prods. Co., Inc., Baltimore, Md.
Stuber & Kuck Co., Peoria, Ill.
Superior Can Co., Inc., Bklyn, N. Y.
Thompson Can Co., Dallas, Tex.
Victor Metal Products Corp., Bklyn, N. Y.
Vulcan Stamping & Mfg. Co., Inc., Bellwood, Ill.
Western Can Co., San Francisco, Calif.
Wisconsin Can Co., Inc., Chicago, Ill.

CANS, TIN
(Cellulose Window)

Clark, Geo. V. Co., Inc., Long Island City, N. Y.
Purepac Corp., New York, N. Y.

CARTONS, CAN & BOTTLE CARRIERS

Albert Paper Box Co., Inc., Bklyn, N. Y.
American Coating Mills, Inc., Elkhart, Ind.
Andrews, O. B. Co., Chattanooga, Tenn.
Ashtabula Corrugated Box Co., The, Ashtabula, Ohio
Atlantic Carton Corp., Norwich, Conn.
Badger Merchandising Displays, Inc., Milwaukee, Wis.
Berlen Carton Co., Inc., Paterson, N. J.
Blum Folding Paper Box Co., Inc., Bklyn, N. Y.
Brown & Bailey Co., Phila., Pa.
Burt, F. N. Co., Inc., Buffalo, N. Y.
Chicago Carton Co., Chicago, Ill.
Container Corp. of America, Chicago, Ill.
Continental Folding Paper Box Co., Inc., Ridgefield, N. J.
Continental Paper Products Co., Denver, Colo.
Empire Box Corp., Garfield, N. J.
Federal Carton Corp., New York, N. Y.
Fibreboard Products, Inc., San Francisco, Calif.
Fort Orange Paper Co., Castleton-on-Hudson, N. Y.
Fort Wayne Corrugated Paper Co., Fort Wayne, Ind.
Gair, Robert Co., Inc., New York, N. Y.
Gardner-Richardson Co., The, Middletown, Ohio
Gaylord Container Corp., St. Louis, Mo.
Gordon-Lavin Paper Box Co., Inc., Baltimore, Md.
Grand Rapids Paper Box Co., Grand Rapids, Mich.
Hollywood Paper Box Div., The Flintkote Co., Hollywood, Calif.

International Folding Paper Box Co., Inc., North Bergen N. J.
Interstate Folding Box Co., The, Middletown, Ohio
Lengsfield Bros., Inc., New Orleans, La.
Menasha Products Co., The, Div. Marathon Paper Mills, Menasha, Wis.
Milprint, Inc., Milwaukee, Wis.
Morris Paper Mills, Chicago, Ill.
National Metal Edge Box Co., Phila., Pa.
Nelson, B. F. Mfg. Co., Minneapolis, Minn.
Ohio Boxboard Co., The, Wadsworth, Ohio
Owens-Illinois Glass Co., Toledo, Ohio
Paper Package Co., Indianapolis, Ind.
Pohlig Bros., Richmond, Va.
Pollock Paper & Box Co., Dallas, Tex.
Reynolds Metals Co., Richmond, Va.
Richardson-Taylor-Globe Corp., Cincinnati, Ohio
Robertson Paper Box Co., Inc., Montville, Conn.
Rosotti Lithographing Co., Inc., North Bergen, N. J.
Sample-Durick Co., Inc., Indian Orchard, Mass.
Schmidt Lithograph Co., San Francisco, Calif.
Schoettle, Edwin J. Co., Phila., Pa.
Sutherland Paper Co., Kalamazoo, Mich.
Waldorf Paper Products Co., St. Paul, Minn.
Warner Bros. Co., The, Bridgeport, Conn.
Wolverine Carton Co., Grand Rapids, Mich.

CARTONS, FOLDING & DISPLAY

Ace Carton Corp., Chicago, Ill.
Acme Folding Box Co., St. Louis, Mo.
Acme Paper Box Co., Chicago, Ill.
Addison Lithographing Co., Rochester, N. Y.
Albert Paper Box Co., Inc., Bklyn, N. Y.
American Box Board Co., Grand Rapids, Mich.
American Coating Mills, Inc., Elkhart, Ind.
American Folding Box Co., St. Louis, Mo.
American Tri-State Paper Box Co., Nashville, Tenn.
Andrews, O. B. Co., Chattanooga, Tenn.
Andrews, P. L. Corp., Bklyn, N. Y.
Angelus Paper Box Co., Los Angeles, Calif.
Arvey Corp., Chicago, Ill., & Jersey City, N. J.
Atlanta Paper Co., Atlanta, Ga.
Atlantic Carton Corp., Norwich, Conn.
Atlas-Boxmakers, Inc., Chicago, Ill.
Automatic Paper Box Corp., Chicago, Ill.
Badger Carton Co., Milwaukee, Wis.
Barger Box Co., Inc., Elkhart, Ind.
Berles Carton Co., Inc., Paterson, N. J.
Bicknell & Fuller Paper Box Co., Boston, Mass.
Bloomer Bros. Co., Newark, New York State
Blum Folding Paper Box Co., Inc., Bklyn, N. Y.
Bridgeport Paper Box Co., Bridgeport, Conn.
Brooks & Porter, Inc., New York, N. Y.
Brooks Bank Note Co., Springfield, Mass.
Brown & Bailey Co., Phila., Pa.
Burnett, R. L. Co., San Antonio, Texas
Burt, F. N. Co., Inc., Buffalo, N. Y.
Campbell Box & Tag Co., South Bend, Ind.
Carton Service, Inc., Shelby, Ohio
Central Carton Co., Cincinnati, Ohio
Central Paper Box Co., Kansas City, Mo.
Chicago Carton Co., Chicago, Ill.
Chicago Label & Box Co., Chicago, Ill.
Cleveland Cartons Div. of Robert Gair Co., Inc., Cleveland, Ohio
Columbia Paper Box Co., Washington, D. C.
Columbus Paper Box Co., Inc., Columbus, Ohio
Consolidated Paper Co., Monroe, Mich.
Consolidated Paper & Box Mfg. Co., Richmond, Va.
Container Corp. of America, Chicago, Ill.
Continental Folding Paper Box Co., Inc., Ridgefield, N. J.
Continental Paper Prods. Co., Denver, Colo.
Cowles' Box & Display Co., Harold A., Rochester, N. Y.
Crescent Box Corp., Phila., Pa.
Delman Paper Box Co., The, Chicago, Ill.
Dennison Mfg. Co., Framingham, Mass.
Densen-Banner Co., Ridgefield Park, N. J.
Diamond Paper Box Co., Rochester, N. Y.
Disbrow Mfg. Co., Newark, N. J.
Dowd, M. S. Carton Co., Hartford, Conn.
Eastern States Cartons Div. of Robert Gair Co., Inc., Bklyn, N. Y.
Eggerss-O'Flyng Co., Omaha, Nebr.
Empire Box Corp., Chicago, Ill.
Empire Box Corp., Garfield, N. J.
Eureka Paper Box Co., Williamsport, Pa.
Fairchild, E. E. Corp., Rochester, N. Y.
Federal Carton Corp., New York, N. Y.
Fibreboard Products, Inc., San Francisco, Calif.
Fitzhugh, Wm. W. Inc., Bklyn, N. Y.
Fleishhacker Paper Box Co., San Francisco, Calif.
Fleming & Sons, Inc., Dallas, Tex.
Flour City Paper Box Co., Minneapolis, Minn.
Folding Boxes, Inc., Manchester, Conn.
Forbes Lithograph Mfg. Co., Boston, Mass.
Fort Orange Paper Co., Castleton-on-Hudson, N. Y.
Fox, C. J. Co., The, Providence, R. I.
Frankenberg Bros., Inc., Columbus, Ohio
Franklin Folding Paper Box Co., Chicago, Ill.
Gair, Robert Co., Inc., New York, N. Y.
Gardner-Richardson Co., The, Middletown, Ohio
Gaylord Container Corp., St. Louis, Mo.
Gebhart Folding Box Co., Dayton, Ohio
Gereke-Allen Carton Co., St. Louis, Mo.
Globe Paper Box Mfg. Co., St. Paul, Minn.
Gordon-Lavin Paper Box Co., Inc., Baltimore, Md.
Grace, Tom W. Co., Dallas, Tex.
Grand-City Container Corp., New York, N. Y.
Grand Rapids Paper Box Co., Grand Rapids, Mich.
Grant Paper Box Co., Pittsburgh, Pa.
Great Lakes Box Co., Cleveland, Ohio
Guilford Folding Box Co., The, Baltimore, Md.
Hashagen Paper Box Co., Washington, D. C.
High Point Paper Box Co., Inc., High Point, N. C.
Hollywood Paper Box Div., The Flintkote Co., Hollywood, Calif.
Howell, F. M. & Co., Elmira, N. Y.
Hummel & Downing Co., Milwaukee, Wis.
Ideal Carton Co., Chicago, Ill.
Imperial Box Co., Chicago, Ill.
Indianapolis Paper Container Co., Indianapolis, Ind.
International Folding Paper Box Co., Inc., North Bergen, N. J.
Interstate Folding Box Co., Middletown, Ohio
Kindred, MacLean & Co., Inc., Long Island City, N. Y.
Lebanon Paper Box Co., Lebanon, Pa.
Lengsfield Bros., Inc., New Orleans, La.
Lindley Box & Paper Co., Marion, Ind.
Lowman Folding Box Corp., Syracuse, N. Y.
Maryland Paper Box Co., Baltimore, Md.
Menasha Prod. Co., The, Div. Marathon Paper Mills, Menasha, Wis.
Michigan Carton Co., Battle Creek, Mich.
Milprint, Inc., Milwaukee, Wis.
Morris Paper Mills, Chicago, Ill.
Mott Carton & Paper Co., St. Louis, Mo.
Muskegon Paper Box Co., Muskegon, Mich.
Myers, J. & P. B. Inc., Jersey City, N. J.
National Folding Box Co., New Haven, Conn.
National Metal Edge Box Co., Phila., Pa.
National Paper Co., Atlanta, Ga.
National Paper Box Co., Kansas City, Mo.
National Paper Box Mfg. Co., Chicago, Ill.
Nelson, B. F. Mfg. Co., Minneapolis, Minn.
Neumann, Robert Co., Cincinnati, Ohio
Nevins-Church Press, The, New York, N. Y.
New Haven Pulp & Board Co., New Haven, Conn.
Ohio Boxboard Co., The, Wadsworth, Ohio
Old Dominion Box Co., Charlotte, N. C.
Paper Box & Specialty Co., Sheboygan, Wis.
Paper Package Co., Indianapolis, Ind.
Pictorial Paper Package Corp., Aurora, Ill.
Pie-Pak Co., Inc., Hoboken, N. J.
Pioneer Paper Box Co., Minneapolis, Minn.
Pohlig Bros., Richmond, Va.
Pollock Paper & Box Co., Dallas, Tex.
Randolph Box & Label Co., Chicago, Ill.
Randolph Paper Box Co., The, Richmond, Va.
Reynolds Metals Co., Richmond, Va.
Richardson-Taylor-Globe Corp., Cincinnati, Ohio
Robertson Paper Box Co., Inc., Montville, Conn.
Rochester Folding Box Co., Rochester, N. Y.
Rock City Paper Box Co., Nashville, Tenn.
Rosotti Lithographing Co., Inc., North Bergen, N. J.
Royal Paper Box Co., Los Angeles, Calif.
Rudnick, A & A Inc., New York, N. Y.
Sample-Durick Co., Chicopee, Mass.
Scandore Paper Box Co., Inc., Bklyn, N. Y.
Schmidt, Henry & Bro., Inc., Phila., Pa.
Schmidt Lithograph Co., San Francisco, Calif.
Schoettle, Edwin J. Co., Phila., Pa.
Schultz Folding Box Co., St. Louis, Mo.
Schulz, A. Geo. Co., Milwaukee, Wis.
Seaman Box Co., Inc., New York, N. Y.
Sears, Merle Paper Box Co., Danville, Ill.
Self-Locking Carton Co., Chicago, Ill.
Shellmar Products Co., Mt. Vernon, Ohio
Shultz Folding Box Co., St. Louis, Mo.
Shuttleworth Carton Co., New York, N. Y.
Simplex Paper Box Corp., Lancaster, Pa.
Southern Paper Co., Ltd., New Orleans, La.
Standard Paper Box Co., Detroit, Mich.
Standard Paper Box Corp., Los Angeles, Calif.
Stecher-Traung Lithograph Corp., Rochester, N. Y.
Superior Folding Box Co., St. Louis, Mo.
Sutherland Paper Co., Kalamazoo, Mich.
Texas Paper Box Mfg. Co., Dallas, Tex.
Toledo Paper Box Co., The, Toledo, Ohio
Trenton Folding Box Co., Trenton, N. J.
Trum, E. J. Inc., Bklyn, N. Y.
Union Paper Box Co., Seattle, Wash.
United Paperboard Co., New York, N. Y.
United States Printing & Lithograph Co., The, Cincinnati, Ohio
Waldorf Paper Products Co., St. Paul, Minn.
Warneke Paper Box Co., Denver, Colo.
Warner Bros. Co., The, Bridgeport, Conn.
Western Paper Box Co., Oakland, Calif.
Whitney & Co., Leominster, Mass.
Wilkata Folding Box Co., The, Kearny, N. J.
Wilson Paper Box Co., Inc., Richmond, Va.
Wolverine Carton Co., Grand Rapids, Mich.
Zumbiel, C. W. Co., Cincinnati, Ohio

CARTONS, WAXED & PARAFFINED

American Box Board Co., Grand Rapids, Mich.
Andrews, O. B. Co., Chattanooga, Tenn.
Arvey Corp., Chicago, Ill., & Jersey City, N. J.
Atlantic Carton Corp., Norwich, Conn.
Berles Carton Co., Inc., Paterson, N. J.
Bloomer Bros. Co., Newark, New York State
Brooks Bank Note Co., Springfield, Mass.
Brown & Bailey Co., Phila., Pa.
Chicago Carton Co., Chicago, Ill.

Addresses of companies listed appear on pages 755–763

Consolidated Paper Co., Monroe, Mich.
Container Corp. of America, Chicago, Ill.
Continental Paper Products Co., Denver, Colo.
Densen-Banner Co., Ridgefield Park, N. J.
Empire Box Corp., Garfield, N. J.
Federal Carton Corp., New York, N. Y.
Fibreboard Products, Inc., San Francisco, Calif.
Fleishhacker Paper Box Co., San Francisco, Calif.
Fort Orange Paper Co., Castleton-on-Hudson, N. Y.
Fox, C. J. Co., The, Providence, R. I.
Frankenberg Bros., Inc., Columbus, Ohio
Gair, Robert Co., Inc., New York, N. Y.
Gardner-Richardson Co., The, Middletown, Ohio
Gates Paper Co., Ltd., The, Los Angeles, Calif.
Gaylord Container Corp., St. Louis, Mo.
Globe Paper Box Mfg. Co., St. Paul, Minn.
Gordon-Lavin Paper Box Co., Inc., Baltimore, Md.
Grant Paper Box Co., Pittsburgh, Pa.
High Point Paper Box Co., Inc., High Point, N. C.
Hollywood Paper Box Div., The Flintkote Co., Hollywood, Calif.
Interstate Folding Box Co., Middletown, Ohio
Lindley Box & Paper Co., Marion, Ind.
Menasha Products Co., The, Div. Marathon Paper Mills, Menasha, Wis.
Michigan Carton Co., Battle Creek, Mich.
Morris Paper Mills, Chicago, Ill.
National Paper Box Co., Kansas City, Mo.
Nelson, B. F. Mfg. Co., Minneapolis, Minn.
Ohio Boxboard Co., The, Wadsworth, Ohio
Old Dominion Box Co., Charlotte, N. C.
Paper Package Co., Indianapolis, Ind.
Pohlig Bros., Richmond, Va.
Pollock Paper & Box Co., Dallas, Tex.
Reynolds Metals Co., Richmond, Va.
Richardson-Taylor-Globe Corp., Cincinnati, Ohio
Robertson Paper Box Co., Montville, Conn.
Schmidt Lithograph Co., San Francisco, Calif.
Schoettle, Edwin J. Co., Phila., Pa.
Schulz, A. Geo. Co., Milwaukee, Wis.
Shuttleworth Carton Co., Inc., New York, N. Y.
Sutherland Paper Co., Kalamazoo, Mich.
Toledo Paper Box Co., The, Toledo, Ohio
United Paperboard Co., New York, N. Y.
Waldorf Paper Products Co., St. Paul, Minn.
Warner Bros. Co., The, Bridgeport, Conn.
Wolverine Carton Co., Grand Rapids, Mich.
Zumbiel, C. W. Co., Cincinnati, Ohio

COMPACTS, PAPER

Burt, F. N. Co., Inc., Buffalo, N. Y.

CONTAINERS, DEHYDRATED FOODS (Bulk)

Andrews, O. B. Co., Chattanooga, Tenn.
Atlas-Boxmakers, Inc., Chicago, Ill.
Betner, Benj. C. Co., Devon, Pa.
Canister Co., Inc., The, Phillipsburg, N. J.
Carpenter Container Corp., Bklyn, N. Y.
Container Co., The, Van Wert, Ohio
Container Corp. of America, Chicago, Ill.
Gaylord Container Corp., St. Louis, Mo.
Interstate Folding Box Co., Middletown, Ohio
Master Package Corp., The, Owen, Wis.
Pacific Can Co., San Francisco, Calif.
Reynolds Metals Co., Richmond, Va.
Shellmar Products Co., Mount Vernon, Ohio
Sutherland Paper Co., Kalamazoo, Mich.
Twitchell, E. W. Inc., Pkg. Div., Phila., Pa.
Waldorf Paper Products Co., St. Paul, Minn.

CONTAINERS, DEHYDRATED FOODS (Unit)

Andrews, O. B. Co., Chattanooga, Tenn.
Berles Carton Co., Inc., Paterson, N. J.
Betner, Benj. C. Co., Devon, Pa.
Bloomer Bros. Co., Newark, New York State
Canister Co., Inc., The, Phillipsburg, N. J.
Chicago Carton Co., Chicago, Ill.
Container Corp. of America, Chicago, Ill.
Continental Folding Paper Box Co., Inc., Ridgefield, N. J.
Continental Paper Products Co., Denver, Colo.
Fleishhacker Paper Box Co., San Francisco, Calif.
Frankenberg Bros., Inc., Columbus, Ohio
Gardner-Richardson, Co., The, Middletown, Ohio
Gaylord Container Corp., St. Louis, Mo.
Interstate Folding Box Co., Middletown, Ohio
Menasha Products Co., The, Div. Marathon Paper Mills, Menasha, Wis.
Munson Bag Co., The, Cleveland, Ohio
Neostyle, Inc., Chicago, Ill.
Oneida Paper Products, Inc., New York, N. Y.
Reynolds Metals Co., Richmond, Va.
Ritchie, W. C. & Co., Chicago, Ill.
Royal, Thomas M. & Co., Phila., Pa.
Schmidt Lithograph Co., San Francisco, Calif.
Shellmar Products Co., Mt. Vernon, Ohio
Shuttleworth Carton Co., New York, N. Y.
Stecher-Traung Lithograph Corp., Rochester, N. Y.
Sutherland Paper Co., Kalamazoo, Mich.
Traver Corp., Chicago, Ill.
Twitchell, E. W. Inc., Pkg. Div., Phila., Pa.
U. S. Envelope Co., Springfield, Mass.
U. S. Printing & Lithograph Co., The, Cincinnati, Ohio
Waldorf Paper Products Co., St. Paul, Minn.

CONTAINERS, FROZEN FOODS (Bulk)

Andrews, O. B. Co., Chattanooga, Tenn.
Arvey Corp., Chicago, Ill., & Jersey City, N. J.
Carpenter Container Corp., Bklyn, N. Y.
Container Corp. of America, Chicago, Ill.
Dewey & Almy Chemical Co., Cambridge, Mass.
Gaylord Container Corp., St. Louis, Mo.
Sealright Co., Inc., The, Fulton, N. Y.
Thompson Can Company, Dallas, Tex.
Twitchell, E. W. Inc., Pkg. Div., Phila., Pa.
Waldorf Paper Products Co., St. Paul, Minn.

CONTAINERS, FROZEN FOODS (Unit)

Andrews, O. B. Co., Chattanooga, Tenn.
Arvey Corp., Chicago, Ill., & Jersey City, N. J.
Atlantic Carton Corp., Norwich, Conn.
Berles Carton Co., Inc., Paterson, N. J.
Betner, Benj. C. Co., Devon, Pa.
Bloomer Bros. Co., Newark, New York State
Chicago Carton Co., Chicago, Ill.
Container Corp. of America, Chicago, Ill.
Continental Folding Paper Box Co., Inc., Ridgefield, N. J.
Continental Paper Products Co., Denver, Colo.
Dewey & Almy Chemical Co., Cambridge, Mass.
Fleishhacker Paper Box Co., San Francisco, Calif.
Frankenberg Bros., Inc., Columbus, Ohio
Gardner-Richardson Co., The, Middletown, Ohio
Interstate Folding Box Co., Middletown, Ohio
Lily-Tulip Cup Corp., New York, N. Y.
Menasha Products Co., The, Div. Marathon Paper Mills, Menasha, Wis.
Mono Service Co., Newark, N. J.
Munson Bag Co., The, Cleveland, Ohio
Neostyle, Inc., Chicago, Ill.
Oneida Paper Products, Inc., New York, N. Y.
Reynolds Metals Co., Richmond, Va.
Royal, Thomas M. & Co., Phila., Pa.
Sealright Co., Inc., The, Fulton, N. Y.
Shellmar Products Co., Mount Vernon, Ohio
Stecher-Traung Lithograph Corp., Rochester, N. Y.
Sutherland Paper Co., Kalamazoo, Mich.
Thompson Can Co., Dallas, Tex.
Traver Corp., Chicago, Ill.
Twitchell, E. W. Inc., Pkg. Div., Phila., Pa.
U. S. Envelope Co., Springfield, Mass.
Waldorf Paper Products Co., St. Paul, Minn.

CONTAINERS, MOLDED PULP

Chaspec Mfg. Co., New York, N. Y.
Holed-Tite Packing Corp., Herkimer, N. Y.
Keyes Fibre Co., Waterville, Me.
Pulp Reproduction Co., Milwaukee, Wis.
Read, Robert E. Inc., Dexter, N. Y.
Sealright Co., Inc., The, Fulton, N. Y.
Self-Locking Carton Co., Chicago, Ill.

CONTAINERS, PAPER
(Liquid-Holding)

American Can Co., New York, N. Y.
American Paper Goods Co., The, Kensington, Conn.
Betner, Benj. C. Co., Devon, Pa.
Canister Co., Inc., The, Phillipsburg, N. J.
Continental Bag Specialities Corp., New York, N. Y.
Cupples-Hesse Corp., St. Louis, Mo.
Dixie-Vortex Co., Easton, Pa.
Fibreboard Products, Inc., San Francisco, Calif.
Gair, Robert Co., Inc., New York, N. Y.
Gardner-Richardson Co., The, Middletown, Ohio
Interstate Folding Box Co., Middletown, Ohio
Lily Tulip Cup Corp., New York, N. Y.
Mono Service Co., Newark, N. J.
Royal, Thomas M. & Co., Phila., Pa.
Schoettle, Edwin J. Co., Phila., Pa.
Sealright Co., Inc., The, Fulton, N. Y.
Stecher-Traung Litho. Corp., Rochester, N. Y.
Sutherland Paper Co., Kalamazoo, Mich.
Sweetman, Geo. H., Inc., Cambridge, Mass.
Waldorf Paper Products Co., St. Paul, Minn.

CONTAINERS, PAPER
(Milk)

American Can Co., New York, N. Y.
American Paper Bottle Co., Toledo, Ohio
American Sealcone Corp., New York, N. Y.
Brown & Bailey Co., Phila., Pa.
Continental Folding Paper Box Co., Inc., Ridgefield, N. J.
Ex-Cell-O Corp., Detroit, Mich.
Fibreboard Products, Inc., San Francisco, Calif.
Gair, Robert Co., Inc., New York, N. Y.
Gardner-Richardson Co., The, Middletown, Ohio
Menasha Products Co., The, Div. Marathon Paper Mills, Menasha, Wis.
Oneida Paper Products, Inc., New York, N. Y.
Reed Container Sales Corp., New York, N. Y.
Sealright Co., Inc., The, Fulton, N. Y.
Single-Service Containers, Inc., New York, N. Y.
Sutherland Paper Co., Kalamazoo, Mich.

CONTAINERS, PAPER
(Nesting)

American Lace Paper Co., Milwaukee, Wis.
American Paper Goods Co., The, Kensington, Conn.

Bloomer Bros. Co., Newark, New York State
Burt, F. N. Co., Inc., Buffalo, N. Y.
Central States Paper & Bag Co., St. Louis, Mo.
Container Corp. of America, Chicago, Ill.
Cupples-Hesse Corp., St. Louis, Mo.
Densen-Banner Co., Ridgefield Park, N. J.
Dixie-Vortex Co., Easton, Pa.
High Point Paper Box Co., Inc., High Point, N. C.
Lily Tulip Cup Corp., New York, N. Y.
Menasha Products Co., The, Div. Marathon Paper Mills, Menasha, Wis.
Mono Service Co., Newark, N. J.
Old Dominion Box Co., Charlotte, N. C.
Randolph Paper Box Co., Richmond, Va.
Rudnick, A & A Inc., New York, N. Y.
Schoettle, Edwin J. Co., Phila., Pa.
Schulz, A. Geo. Co., Milwaukee, Wis.
Sealright Co., Inc., The, Fulton, N. Y.
Seaman Box Co., Inc., New York, N. Y.
Sutherland Paper Co., Kalamazoo, Mich.
Traver Corp., Chicago, Ill.
Warner Bros. Co., The, Bridgeport, Conn.

CONTAINERS, RIGID TRANSPARENT

Atlanta Box Factory, Inc., Atlanta, Ga.
Birmingham Paper Co., Birmingham, Ala.
Burt, F. N. Co., Inc., Buffalo, N. Y.
Cambridge Paper Box Co., Cambridge, Mass.
Celluplastic Corp., Newark, N. J.
Central States Paper & Bag Co., St. Louis, Mo.
Clark, Geo. V. Co., Inc., Long Island City, N. Y.
Gair, Robert Co., Inc., New York, N. Y.
Great American Plastics Co., Leominster, Mass.
Henry, Ira L. Co., Watertown, Wis.
Lebanon Paper Box Co., Lebanon, Pa.
Lusteroid Container Co., Inc., S. Orange, N. J.
Miller, Walter P. Co., Inc., Phila., Pa.
Neostyle, Inc., Chicago, Ill.
Niemand Bros., Inc., Long Island City, N. Y.
Owens-Illinois Glass Co., Toledo, Ohio
Pedersen, H. Mfg. Co., Los Angeles, Calif.
Ritchie, W. C. & Co., Chicago, Ill.
Shaw Paper Box Co., Pawtucket, R. I.
Sillcocks-Miller Co., The, S. Orange, N. J.
Sterling Injection Molding, Inc., Buffalo, N. Y.
Sutherland Paper Co., Kalamazoo, Mich.
Tower Envelope Co., New York, N. Y.
U. S. Envelope Co., Springfield, Mass.
Waldorf Paper Products Co., St. Paul, Minn.
Warner Bros. Co., The, Bridgeport, Conn.
Young, Everett Co., Providence, R. I.

CONTAINERS, SHIPPING WEATHERPROOF FIBRE

American Box Board Co., Grand Rapids, Mich.
Andrews, O. B. Co., Chattanooga, Tenn.
Ashtubula Corrugated Box Co., The, Ashtubula, Ohio
Atlas-Boxmakers, Inc., Chicago, Ill.
Bird & Son, Inc., East Walpole, Mass.
Carpenter Container Corp., Bklyn, N. Y.
Consolidated Paper Co., Monroe, Mich.
Container Corp. of America, Chicago, Ill.
Crook Paper Box Co., No. Kansas City, Mo.
Erie Corrugated Box Co., The, Erie, Pa.
Fort Wayne Corrugated Paper Co., Fort Wayne, Ind.
Gair, Robert Co., Inc., New York, N. Y.
Gaylord Container Corp., St. Louis, Mo.
Hinde & Dauch Paper Co., The, Sandusky, Ohio
Inland Container Corp., Indianapolis, Ind.
National Container Corp., Long Island City, N. Y.
Ohio Boxboard Co., The, Wadsworth, Ohio
Reynolds Metals Co., Richmond, Va.
U. S. Envelope Co., Springfield, Mass.
Waldorf Paper Products Co., St. Paul, Minn.

CRATES, WOOD & PLYWOOD

Anderson Box & Basket Co., New York N. Y.

DISPLAYS, COUNTER

Advertising Metal Display Co., Chicago, Ill.
Andrews, O. B. Co., Chattanooga, Tenn.
Arrow Mfg. Co., Inc., Hoboken, N. J.
Arvey Corp., Chicago, Ill., & Jersey City, N. J.
Autokraft Box Corp., Hanover, Pa.
Badger Merchandising Displays, Inc., Milwaukee, Wis.
Berles Carton Co., Inc., Paterson, N. J.
Bronzart Metals Co., New York, N. Y.
Chaspec Mfg. Co., New York, N. Y.
Columbia Paper Box Co., Washington, D. C.
DeNina, James Andrew, New York, N. Y.
Design Center, Inc., New York, N. Y.
Displayers, The, New York, N. Y.
Forbes Lithograph Mfg. Co., Boston, Mass.
Fox, C. J. Co., The, Providence, R. I.
Gair, Robert Co., Inc., New York, N. Y.
Gaylord Container Corp., St. Louis, Mo.
Gutterson & Co., Inc., New York, N. Y.
Harlich Mfg. Co., Mastercraft Div., Chicago, Ill.
Helmco, Inc., Chicago, Ill.
Hinde & Dauch Paper Co., Sandusky, Ohio
Interstate Folding Box Co., Middletown, Ohio
Kay Displays, Inc., New York, N. Y.
Kayton, Robert Displays, Inc., New York, N. Y.
Kindred, MacLean & Co., Inc., Long Island City, N. Y.
Lengsfield Bros., Inc., New Orleans, La.
Leominster Paper Box Co., Leominster, Mass.
Livingston & Co., Inc., New York, N. Y.
Magill-Weinsheimer Co., Chicago, Ill.
Mandus Co., Inc., New York, N. Y.
Michigan Lithographing Co., Grand Rapids, Mich.
Milprint, Inc., Milwaukee, Wis.
Morris Paper Mills, Chicago, Ill.
National Color Printing Co., Inc., The, Baltimore, Md.
National Folding Box Co., New Haven, Conn.
New England Box Co., Greenfield, Mass.
Nicoll & Co., San Francisco, Calif.
Pilliod Cabinet Co., The, Swanton, Ohio
Process Displays, Inc., Milwaukee, Wis.
Rathbun Molding Corp., Salamanca, N. Y.
Regent Specialties, Inc., Rochester, N. Y.
Reynolds Metals Co., Richmond, Va.
Roesch, Louis Co., San Francisco, Calif.
Schmidt Lithograph Co., San Francisco, Calif.
Schunack, C. E. Inc., Meriden, Conn.
Schutz, Thom. A. Co., Chicago, Ill.
Shaw Paper Box Co., Pawtucket, R. I.
Simplex Paper Box Corp., Lancaster, Pa.
Smith, S. K. Co., Chicago, Ill.
Stecher-Traung Lithograph Corp., Rochester, N. Y.
Stensgaard, W. L. & Assocs., Chicago, Ill.
Trautmann, Bailey & Blampey, New York, N. Y.
U. S. Printing & Lithograph Co., The, Cincinnati, Ohio
Waldorf Paper Products Co., St. Paul, Minn.
Warner Bros. Co., The, Bridgeport, Conn.
Wolverine Carton Co., Grand Rapids, Mich.
Young, Everett Co., Providence, R. I.

DISPLAYS, FLOOR STAND

(Corrugated & Solid Fibre)

American Box Board Co., Grand Rapids, Mich.
Arvey Corp., Chicago, Ill., & Jersey City, N. J.
Badger Merchandising Displays, Inc., Milwaukee, Wis.
Container Corp. of America, Chicago, Ill.
Continental Container Corp., Bklyn, N. Y.
Display Finishing Co., Inc., Long Island City, N. Y.
Eddy Paper Corp., Chicago, Ill.
Edwards & Deutsch Lithographing Co., Chicago, Ill.
Excelsior Paper Specialties Co., New York, N. Y.
Federal Carton Corp., New York, N. Y.
Fibreboard Products, Inc., San Francisco, Calif.
Forbes Lithograph Mfg. Co., Boston, Mass.
Gair, Robert Co., Inc., New York, N. Y.
Gaylord Container Corp., St. Louis, Mo.
Gereke-Allen Carton Co., St. Louis, Mo.
Grand-City Container Corp., New York, N. Y.
Hankins Container Co., Cleveland, Ohio
Helmco, Inc., Chicago, Ill.
Hinde & Dauch Paper Co., Sandusky, Ohio
Inland Container Corp., Indianapolis, Ind.
Kay Displays, Inc., New York, N. Y.
Kayton, Robert Displays, Inc., New York, N. Y.
Keystone Box Co., Pittsburgh, Pa.
Kindred, MacLean & Co., Inc., Long Island City, N. Y.
Kress, F. J. Box Co., Pittsburgh, Pa.
Magill-Weinsheimer Co., Chicago, Ill.
Milprint, Inc., Milwaukee, Wis.
National Container Corp., Long Island City, N. Y.
Nelson, B. F. Mfg. Co., Minneapolis, Minn.
Niagara Lithograph Co., Buffalo, N. Y.
Oberly & Newell Lithograph Corp., New York, N. Y.
Ohio Boxboard Co., The, Wadsworth, Ohio
Old Dominion Box Co., Inc., Charlotte, N. C.
Ottawa River Paper Co., The, Toledo, Ohio
Process Displays, Inc., Milwaukee, Wis.
Regent Specialties, Inc., Rochester, N. Y.
Reyburn Mfg. Co., Inc., The, Phila., Pa.
Reynolds Metals Co., Richmond, Va.
Schmidt Lithograph Co., San Francisco, Calif.
Schutz, Thom. A. Co., Chicago, Ill.
Sherman Paper Products Corp., Newton Upper Falls, Mass.
Stecher-Traung Lithograph Corp., Rochester, N. Y.
Stensgaard, W. L. & Associates, Chicago, Ill.
Waldorf Paper Products Co., St. Paul, Minn.

DISPLAYS, METAL, SHEET

Advertising Metal Display Co., Chicago, Ill.
American Can Co., New York, N. Y.
Bronzart Metals Co., New York, N. Y.
Design Center, Inc., New York, N. Y.
Farrington Mfg. Co., Boston, Mass.
Grammes, L. F. & Sons, Inc., Allentown, Pa.
Heekin Can Co., Cincinnati, Ohio
Helmco, Inc., Chicago, Ill.
Kay Displays, Inc., New York, N. Y.
Kayton, Robert Displays, Inc., New York, N. Y.
Reynolds Metals Co., Richmond, Va.

DISPLAYS, WIRE

Gray Wire Specialty Co., The, Cleveland, Ohio
Union Steel Products Co., Albion, Mich.
Washburn Co., The, Worcester, Mass.

DRUMS, FIBRE

Bird & Son, Inc., East Walpole, Mass.
Canister Co., Inc., The, Phillipsburg, N. J.
Carpenter Container Corp., Bklyn, N. Y.
Cleveland Container Co., The, Cleveland, Ohio

Addresses of companies listed appear on pages 755–763

Consolidated Paper Co., Monroe, Mich.
Container Co., The, Van Wert, Ohio
Container Corp. of America, Chicago, Ill.
Fibreboard Products, Inc., San Francisco, Calif.
Gardner-Richardson Co., The, Middletown, Ohio
Gates Paper Co., Ltd., The, Los Angeles, Calif.
Gaylord Container Corp., St. Louis, Mo.
Keystone Fibre Drum Co., Pittsburgh, Pa.
Master Package Corp., The, Owen, Wis.

DRUMS, METAL

Aluminum Co. of America, Pittsburgh, Pa.
American Can Co., New York, N. Y.
Central Can Co., Chicago, Ill.
Central Can Co., Inc., Kansas City, Mo.
Continental Can Co., New York, N. Y.
Crown Can Co., Phila., Pa.
Ellis, George D. & Sons, Inc., Phila., Pa.
Heekin Can Co., Cincinnati, Ohio
Owens-Illinois Can Co., Toledo, Ohio
Republic Steel Corp., Cleveland, Ohio
Reynolds Metals Co., Richmond, Va.
Thompson Can Company, Dallas, Tex.
Wheeling Corrugating Co., Wheeling, W. Va.
Wilson & Bennett Mfg. Co., The, Chicago, Ill.

DRUMS, PLYWOOD

Seymour & Peck Co., Chicago, Ill.

ENVELOPES, CLOTH & COTTON-LINED PAPER

American Paper Goods Co., The, Kensington, Conn.
Andrews, P. L. Corp., Bklyn, N. Y.
Cottonluxe Mfg. Co., New York, N. Y.
Herz, Alexander Co., Inc., New York, N. Y.
Tension Envelope Corp., New York, N. Y.
U. S. Envelope Co., Springfield, Mass.
Varey-Shea Bag Corp., Elizabeth, N. J.

ENVELOPES, MERCHANDISE DISPLAY

Andrews, P. L. Corp., Brooklyn, N. Y.
Brown Bag Filling Machine Co., The, Fitchburg, Mass.
Continental Bag Specialities Corp., New York, N. Y.
Neostyle, Inc., Chicago, Ill.
Oneida Paper Products, Inc., New York, N. Y.
Stecher-Traung Lithograph Corp., Rochester, N. Y.
Tower Envelope Co., New York, N. Y.

ENVELOPES, TRANSPARENT

Alderman Paper Box Corp., Rochester, N. Y.
American Paper Goods Co., The, Kensington, Conn.
Andrews, P. L. Corp., Bklyn, N. Y.
Berkowitz Envelope Co., Kansas City, Mo.
Central States Paper & Bag Co., St. Louis, Mo.
Clark, Geo. V. Co., Inc., Long Island City, N. Y.
Comet Envelope & Paper Co., Inc., New York, N. Y.
Continental Bag Spec. Corp., New York, N. Y.
Crystal Transparent Mfg. Co., Inc., New York, N. Y.
Crystal Tube Corp., Chicago, Ill.
Cupples-Hesse Corp., St. Louis, Mo.
Dennison Mfg. Co., Framingham, Mass.
Dobeckmun Co., The, Cleveland, Ohio
Herz, Alexander Co., Inc., New York, N. Y.
Humitube Mfg. Co., Peoria, Ill.
Interstate Folding Box Co., Middletown, Ohio
Mason Envelope Co., New York, N. Y.
Milprint, Inc., Milwaukee, Wis.
Munson Bag Co., The, Cleveland, Ohio
Neostyle, Inc., Chicago, Ill.
Newark Paraffine & Parchment Paper Co., Newark, N. J.
Oneida Paper Products, Inc., New York, N. Y.
Print-A-Tube Co., Passaic, N. J.
Royal, Thomas M. & Co., Phila., Pa.
Seaman Box Co., New York, N. Y.
Shellmar Products Co., Mt. Vernon, Ohio
Sillcocks-Miller Co., The, S. Orange, N. J.
Tension Envelope Corp., New York, N. Y.
Tower Envelope Co., New York, N. Y.
Trans-Pac Services, Inc., New York, N. Y.
Traver Corp., Chicago, Ill.
Twitchell, E. W. Inc., Pkg. Div., Phila., Pa.
U. S. Envelope Co., Springfield, Mass.

JARS, GLASS

Anchor Hocking Glass Corp., Lancaster, Ohio
Armstrong Cork Co., Lancaster, Pa.
Ball Brothers Co., Muncie, Ind.
Braun, W. Co. Chicago, Ill.
Brockway Glass Co., Brockway, Pa.
Carr-Lowrey Glass Co., Baltimore, Md.
Glass Containers, Inc., Los Angeles, Calif.
Hazel-Atlas Glass Co., Wheeling, W. Va.
Kimble Glass Co., Vineland, N. J.
Owens-Illinois Glass Co., Toledo, Ohio
Pennsylvania Glass Products Co., Pittsburgh, Pa.
Swindell Brothers, Baltimore, Md.
Wheaton, T. C. Co., Millville, N. J.

JARS, OPAL

Anchor Hocking Glass Corp., Lancaster, Ohio
Braun, W. Co., Chicago, Ill.
Carr-Lowrey Glass Co., Baltimore, Md.
Hazel-Atlas Glass Co., Wheeling, W. Va.
Kimble Glass Co., Vineland, N. J.
Wheaton, T. C. Co., Millville, N. J.

PACKETS

American Paper Goods Co., The, Kensington, Conn.
Andrews, P. L. Co., Bklyn, N. Y.
Berkowitz Envelope Co., Kansas City, Mo.
Bradner Smith & Co., Chicago, Ill.
Brooks & Porter, Inc., New York, N. Y.
Brown Bag Filling Machine Co., The, Fitchburg, Mass.
Continental Bag Specialties Corp., New York, N. Y.
Cupples-Hesse Corp., St. Louis, Mo.
Dennison Mfg. Co., Framingham, Mass.
Equitable Paper Bag Co., Inc., Long Island City, N. Y.
Humitube Mfg. Co., Peoria, Ill.
Mason Envelope Co., New York, N. Y.
Neostyle, Inc., Chicago, Ill.
Oneida Paper Prods., Inc., New York, N. Y.
Reynolds Metals Co., Richmond, Va.
Royal Paper Corp., New York, N. Y.
Schmidt, Henry & Bro., Inc., Phila., Pa.
Stecher-Traung Litho. Corp., Rochester, N. Y.
Tension Envelope Corp., New York, N. Y.
Tower Envelope Co., New York, N. Y.
Traver Corp., Chicago, Ill.
U. S. Envelope Co., Springfield, Mass.
Wolf Bros., Phila., Pa.

POTTERY CONTAINERS

Andrews, O. B. Co., Chattanooga, Tenn.
Floramics Co., The, Tampa, Fla.
Greene's Ceramic Products Co., Inc., Sebring, Ohio
Hull, A. E. Pottery Co., Crooksville, Ohio
Na-Mac Products Corp., Los Angeles, Calif.
Purinton Pottery Co., Wellesville, Ohio
Robinson Clay Product Co., New York, N. Y.
Spaulding China Co., Inc., Sebring, Ohio
Western Stoneware Co., Monmouth, Ill.
Zanesville Stoneware Co., Zanesville, Ohio

TUBES, COLLAPSIBLE

(Aluminum, Lead, Tin & Alloys)

Aluminum Co. of America, Pittsburgh, Pa.
Art Tube Co., Inc., Irvington, N. J.
National Collapsible Tube Co., Providence, R. I.
New England Collapsible Tube Co., Chicago, Ill.
Peerless Tube Co., Bloomfield, N. J.
Reynolds Metals Co., Richmond, Va.
Standard Specialty & Tube Co., New Brighton, Pa.
Sun Tube Corp., Hillside, N. J.
Turner White Metal Co., Inc., New Brunswick, N. J.
Victor Metal Products Corp., Bklyn, N. Y.
White Metal Mfg. Co., Hoboken, N. J.
Wirz, A. H. Inc., Chester, Pa.

TUBES, FIBRE

Cleveland Container Co., The, Cleveland, Ohio
Sefton Fibre Can Co., St. Louis, Mo.
Sutherland Paper Co., Kalamazoo, Mich.

TUBES, PLASTIC

Celluplastic Corp., Newark, N. J.

TUMBLERS

(Glass)

Anchor Hocking Glass Corp., Lancaster, Ohio
Ball Bros. Co., Muncie, Ind.
Corning Glass Works, Corning, N. Y.
Hazel-Atlas Glass Co., Wheeling, W. Va.
Libby Glass Mfg. Co., Toledo, Ohio
Owens-Illinois Glass Co., Toledo, Ohio
Tygart Valley Glass Co., Washington, Pa.

VIALS, CELLULOSE

Celluplastic Corp., Newark, N. J.
Lusteroid Container Co., Inc., S. Orange, N. J.

VIALS, GLASS

Glass Industries, Inc., New York, N. Y.
Hazel-Atlas Glass Co., Wheeling, W. Va.
Kimble Glass Co., Vineland, N. J.
Owens-Illinois Glass Co., Toledo, Ohio
Pennsylvania Glass Products Co., Pittsburgh, Pa.
Price, M. B. Associates, New York, N. Y.
Wheaton, T. C. Co., Millville, N. J.

VIALS, METAL

Aluminum Container Corp., Fulton, N. Y.
American Aluminum Ware Co., Newark N. J.
Art Tube Co., Inc., Irvington, N. J.
Clark, J. L. Mfg. Co., Rockford, Ill.
Sun Tube Corp., Hillside, N. J.
Victor Metal Products Corp., Bklyn, N. Y.

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MACHINERY AND EQUIPMENT

CONVEYORS

Alvey-Ferguson Co., The, Cincinnati, Ohio
Amsco Packaging Machinery Inc., Long Island City, N. Y.
Chain Belt Co., Milwaukee, Wis.
Container Equipment Corp., Newark, N. J.
Crown Cork & Seal Co., Baltimore, Md.
Ferguson, J. L. Co., Joliet, Ill.
Gump. B. F. Co., Chicago, Ill.
Hulbert Engineering Corp., Watertown, Wis.
Jeffrey Mfg. Co., The, Columbus, Ohio
Lamson Corp., Syracuse, N. Y.
Link-Belt Co., Chicago, Ill.
Liquid Carbonic Corp., The, Chicago, Ill.
Logan Co., Louisville, Ky.
Mathews Conveyer Co., Ellwood City, Pa.
McGuire, Walter, Bklyn, N. Y.
Mercer-Robinson, New York, N. Y.
Mojonnier Bros. Co., Chicago, Ill.
Palmer, Frank D., Inc., Chicago, Ill.
Rapids-Standard Co., Inc., The, Grand Rapids, Mich.
Standard Conveyor Co., North St. Paul, Minn.
Standard-Knapp Corp., Portland, Conn.
Triangle Package Machinery Co., Chicago, Ill.
U. S. Automatic Box Machinery Co., Inc., Boston, Mass.
U. S. Rubber Co., New York, N. Y.
Waldron, John Corp., New Brunswick, N. J.
Weigh Right Automatic Scale Co., Joliet, Ill.

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Alvey-Ferguson Co., The, Cincinnati, Ohio
Amsco Packaging Machinery, Inc., Long Island City, N. Y.
Food Machinery Corp., Sprague-Sells Div., Hoopeston, Ill.
Horix Mfg. Co., Pittsburgh, Pa.
Hulbert Engineering Corp., Watertown, Wis.
Jeffrey Mfg. Co., The, Columbus, Ohio
Lamson Corp., Syracuse, N. Y.
Link-Belt Co., Chicago, Ill.
Logan Co., Louisville, Ky.
Mathews Conveyor Co., Ellwood City, Pa.
Paslode Co., Chicago, Ill.
Rapids-Standard Co., Inc., The, Grand Rapids, Mich.
Scientific Filter Co., New York, N. Y.
Standard Conveyor Co., North St. Paul, Minn.
Syntron Co., Homer City, Pa.
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Ferguson, J. L. Co., Joliet, Ill.
Freedman Die Cutters, Inc., New York, N. Y.
Genesee Finishing Corp., Rochester, N. Y.
Harris-Seybold-Potter Co., Dayton, Ohio
Helmold, J. F. & Bro., Inc., Chicago, Ill.
Indianapolis Paper Container Co., Indianapolis, Ind.
Inman Mfg. Co., Inc., Amsterdam, N. Y.
Lansky Die Cutting Co., New York, N. Y.
Palmer, Frank D., Inc., Chicago, Ill.
Pohlig Bros., Richmond, Va.
U. S. Finishing & Mfg. Co., Chicago, Ill.

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Bingham Bros. Co., New York, N. Y.
Hudson-Sharp Machine Co., Green Bay, Wis.
Marconetti, A. E. Inc., New York, N. Y.
Moyer & Pratt, Inc., Lyons Falls, N. Y.
Rotogravure Engineering Co., East Boston, Mass.
Waldron, John Corp., New Brunswick, N. J.

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Acme Staple Co., Camden, N. J.
Bostitch, Inc., E. Greenwich, R. I.
Harris-Seybold-Potter Co., Dayton, Ohio
Heller Co., The, Cleveland, Ohio
Paslode Co., Chicago, Ill.

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Lakso Company, Fitchburg, Mass.
U. S. Bottlers Machinery Co., Chicago, Ill.

MACHINES, BAG & ENVELOPE *(Filling)*

Amsco Packaging Machinery, Inc., Long Island City, N. Y.
Automatic Scale Co., Inc., New York, N. Y.
Ayers, John W. & Son, Bloomfield, N. J.
Bagpak, Inc., New York, N. Y.
Brown Bag Filling Machine Co., The, Fitchburg, Mass.
Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Exact Weight Scale Co., The, Columbus, Ohio
Ferguson, J. L. Co., Joliet, Ill.
Food Packaging Div. of Milprint, Inc., Milwaukee, Wis.
Goat, Fred Co., Inc., The, Bklyn, N. Y.
Gump, B. F. Co., Chicago, Ill.
International Paper Products Div. of International Paper Co., New York, N. Y.
Ivers-Lee Co., Newark, N. J.
Miller Wrapping & Sealing Machine Co., Chicago, Ill.
Pack-Rite Machines, Milwaukee, Wis.
Palmer, Frank D., Inc., Chicago, Ill.
Pneumatic Scale Corp., Ltd., North Quincy, Mass.
Redington, F. B. Co., Chicago, Ill.
Richard Machine Co., Battle Creek, Mich.
St. Regis Paper Co., New York, N. Y.
Simplex Wrapping Machine Co., Oakland, Calif.
Stokes & Smith Co., Phila., Pa.
Triangle Package Machinery Co., Chicago, Ill.
U. S. Automatic Box Machinery Co., Inc., Boston, Mass.
Weigh Right Automatic Scale Co., Joliet, Ill.
Wright's Automatic Machinery Co., Durham, N. C.

MACHINES, BAG & ENVELOPE *(Making)*

Amsco Packaging Machinery, Inc., Long Island City, N. Y.
Harris-Seybold-Potter Co., Dayton, Ohio
Hayssen Mfg. Co., Sheboygan, Wis.
Heinrich, H. H. Inc., New York, N. Y.
Hudson-Sharp Machine Co., Green Bay, Wis.
Ivers-Lee Co., Newark, N. J.
Miller Wrapping & Sealing Machine Co., Chicago, Ill.
Modern Containers, Inc., Los Angeles, Calif.
Package Machinery Co., Springfield, Mass.
Palmer, Frank D., Inc., Chicago, Ill.
Peters Machinery Co., Chicago, Ill.
Pneumatic Scale Corp., Ltd., North Quincy, Mass.
Potdevin Machine Co., Bklyn, N. Y.
Richard Machine Co., Battle Creek, Mich.
Simplex Wrapping Machine Co., Oakland, Calif.
Smith & Winchester Mfg. Co., S. Windham, Conn.
Smithe, F. L. Machine Co., Inc., New York, N. Y.
Staude, E. G. Mfg. Co., St. Paul, Minn.
Stokes & Smith Co., Philadelphia, Pa.
Triangle Package Machinery Co., Chicago, Ill.
U. S. Automatic Box Machinery Co., Inc., Boston, Mass.
Waldron, John Corp., New Brunswick, N. J.
Weber, H. G. & Co., Inc., Kiel, Wis.
Wrap-Ade Machine Co., Inc., Newark, N. J.
Wright's Automatic Machinery Co., Durham, N. C.

MACHINES, BAG & ENVELOPE *(Sealing)*

Acme Staple Co., Camden, N. J.
Amsco Packaging Machinery, Inc., Long Island City, N. Y.
Arenco Machine Co., Inc., New York, N. Y.
Bagpak, Inc., New York, N. Y.
Bemis Bro. Bag Co., St. Louis, Mo.
Betner, Benj. C. Co., Devon, Pa.
Bostitch, Inc., East Greenwich, R. I.
Cleveland Crimping Press Div., Cleveland Lathe & Machine Co., Cleveland, Ohio
Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Container Equipment Corp., Newark, N. J.
Food Packaging Div. of Milprint, Inc., Milwaukee, Wis.
Goat, Fred Co., Inc., The, Bklyn, N. Y.
Gump, B. F. Co., Chicago, Ill.
Harris-Seybold-Potter Co., Dayton, Ohio
Heat Seal-It Co., Phila., Pa.
International Paper Products Div. of International Paper Co., New York, N. Y.
Ivers-Lee Co., Newark, N. J.
Miller Wrapping & Sealing Machine Co., Chicago, Ill.
Modern Containers, Inc., Los Angeles, Calif.
Package Machinery Co., Springfield, Mass.
Pack-Rite Machines, Milwaukee, Wis.
Palmer, Frank D., Inc., Chicago, Ill.
Pneumatic Scale Corp., Ltd., North Quincy, Mass.
Potdevin Machine Co., Bklyn, N. Y.
Redington, F. B. Co., Chicago, Ill.
Richard Machine Co., Battle Creek, Mich.
St. Regis Paper Co., New York, N. Y.
Saranac Machine Co., Benton Harbor, Mich.
Simplex Wrapping Machine Co., Oakland, Calif.
Stokes & Smith Co., Phila., Pa.
Triangle Package Machinery Co., Chicago, Ill.
Wrap-Ade Machine Co., Inc., Newark, N. J.
Wright's Automatic Machinery Co., Durham, N. C.

MACHINES, BAG SEWING

Bagpak, Inc., New York, N. Y.
Consolidated Packaging Machinery Corp., Buffalo, N. Y.
International Paper Products Div. of International Paper Co., New York, N. Y.
Potdevin Machine Co., Bklyn, N. Y.
St. Regis Paper Co., New York, N. Y.

MACHINES, BAG STAPLING

Acme Staple Co., Camden, N. J.
Acme Steel Co., Chicago, Ill.
Bates Mfg. Co., The, New York, N. Y.
Bostitch, Inc., East Greenwich, R. I.
Dexter Folder Co., New York, N. Y.
Globe Mfg. Co., Phila., Pa.

Addresses of companies listed appear on pages 755–763

Harris-Seybold-Potter Co., Dayton, Ohio
Heller Co., The, Cleveland, Ohio
Paslode Co., Chicago, Ill.
Saranac Machine Co., Benton Harbor, Mich.

MACHINES, BANDING & WIRE STRAPPING

Acme Steel Co., Chicago, Ill.
Gerrard Steel Strapping Co., Chicago, Ill.
Knowlton, M. D. Co., Rochester, N. Y.
Scandia Mfg. Co., No. Arlington, N. J.
Stanley Works, The, New Britain, Conn.

MACHINES, BOTTLE CLEANING
(Air)

Kiefer, Karl Machine Co., Cincinnati, Ohio
Mojonnier Bros. Co., Chicago, Ill.
Pneumatic Scale Corp., Ltd., North Quincy, Mass.
U. S. Bottlers Machinery Co., Chicago, Ill.

MACHINES, BOTTLE CLEANING
(Washing)

Kiefer, Karl Machine Co., Cincinnati, Ohio
Liquid Carbonic Corp., The, Chicago, Ill.
U. S. Bottlers Machinery Co., Chicago, Ill.

MACHINES, BOX COLLAPSING

International Paper Box Machine Co., The, Nashua, N. H.
Staude, E. G. Mfg. Co., St. Paul, Minn.
U. S. Automatic Box Machinery Co., Boston, Mass.

MACHINES, BOX MAKING
(Set-Up)

Globe Mfg. Co., Phila., Pa.
Harris-Seybold-Potter Co., Dayton, Ohio
Inman Mfg. Co., Inc., Amsterdam, N. Y.
Knowlton, M. D. Co., Rochester, N. Y.
National Metal Edge Box Co., Phila., Pa.
New Jersey Machine Corp., Hoboken, N. J.
Potdevin Machine Co., Bklyn, N. Y.
Redington Co., F. B., Chicago, Ill.
Stokes & Smith Co., Phila., Pa.
U. S. Automatic Box Machinery Co., Inc., Boston, Mass.

MACHINES, BOX WINDOW APPLYING

Champlain Div., The Fred Coat Co., Inc., New York, N. Y.
International Paper Box Machine Co., The, Nashua, N. H.
New Jersey Machine Corp., Hoboken, N. J.
Smithe, F. L. Machine Co., Inc., New York, N. Y.
Staude, E. G. Mfg. Co., St. Paul, Minn.
Stokes & Smith Co., Phila., Pa.

MACHINES, BUNDLE TYING
(String)

Bunn, B. H. Co., Chicago, Ill.
Globe Mfg. Co., Phila., Pa.
Potdevin Machine Co., Bklyn, N. Y.

MACHINES, CAN CAPPING

Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Crown Cork & Seal Co., Baltimore, Md.
Ferguson, J. L. Co., Joliet, Ill.
Food Machinery Corp., Sprague-Sells Div., Hoopeston, Ill.
Kiefer, Karl Machine Co., The, Cincinnati, Ohio
Liquid Carbonic Corp., The, Chicago, Ill.
Pneumatic Scale Corp., Ltd., North Quincy, Mass.
Scientific Filter Co., New York, N. Y.
Stokes & Smith Co., Phila., Pa.
U. S. Automatic Box Machinery Co., Inc., Boston, Mass.
U. S. Bottlers Machinery Co., Chicago, Ill.
Williams Sealing Corp., Decatur, Ill.

MACHINES, CAN CLOSING & SEALING

American Can Co., New York, N. Y.
Ams, Max Machine Co., The, Bridgeport, Conn.
Amsco Packaging Machinery Inc., New York, N. Y.
Consolidated Packaging Machinery Corp. Buffalo, N. Y.
Continental Can Co., Inc., New York, N. Y.
Crown Can Co., Phila., Pa.
Ferguson, J. L. Co., Joliet, Ill.
Gates Paper Ltd., Los Angeles, Calif.
Heekin Can Co., Cincinnati, Ohio
Kiefer, Karl Machine Co., The, Cincinnati, Ohio
National Can Corp., New York, N. Y.
Pneumatic Scale Corp., Ltd., North Quincy, Mass.
Stokes & Smith Co., Phila., Pa.
Triangle Package Machinery Co., Chicago, Ill.

MACHINES, CAN FILLING, LIQUID

Alsop Engineering Corp., New York, N. Y.
Colton, Arthur Co., Detroit, Mich.
Crown Cork & Seal Co., The, Baltimore, Md.
Ertel Engineering Corp., Kingston, N. Y.
Food Machinery Corp., Sprague-Sells Div., Hoopeston, Ill.
Horix Manufacturing Co., Pittsburgh, Pa.
Kiefer, Karl Machine Co., The, Cincinnati, Ohio
Liquid Carbonic Corp., The, Chicago, Ill.
Mojonnier Bros. Co., Chicago, Ill.
Pneumatic Scale Corp., Ltd., North Quincy, Mass.
Scientific Filter Co., New York, N. Y.
Stokes, F. J., Machine Co., Phila., Pa.
U. S. Bottlers Machinery Co., Chicago, Ill.
Vol-U-Meter Co., The, Buffalo, N. Y.

MACHINES, CAN LABELING

Burt Machine Co., Baltimore, Md.
Ferguson, J. L. Co., Joliet, Ill.
Food Machinery Corp., Sprague-Sells Div., Hoopeston, Ill.
Glue Fast Equipment Co., Inc., New York, N. Y.
Knowlton, M. D. Co., Rochester, N. Y.
Liquid Carbonic Corp., The, Chicago, Ill.
New Jersey Machine Corp., Hoboken, N. J.
Pneumatic Scale Corp., Ltd., North Quincy, Mass.
Potdevin Machine Co., Bklyn, N. Y.
Scientific Filter Co., New York, N. Y.
Standard-Knapp Corp., Portland, Conn.

MACHINES, CAN WRAPPING

Burt Machine Co., Baltimore, Md.
Ferguson, J. L. Co., Joliet, Ill.
Knowlton M. D. Co., Rochester, N. Y.
Miller Wrapping & Sealing Machine Co., Chicago, Ill.
Package Machinery Co., Springfield, Mass.
Redington, F. B. Co., Chicago, Ill.
Richard Machine Co., Battle Creek, Mich.
Standard-Knapp Corp., Portland, Conn.

MACHINES, CAP & COVER LINING

Ams, Max Machine Co., Bridgeport, Conn.
Dewey & Almy Chemical Co., Cambridge, Mass.

MACHINES, CAPPING

Aluminum Co. of America, Pittsburgh, Pa.
Aluminum Steel Co., New Kensington, Pa.
Anchor Hocking Glass Corp., Lancaster Ohio
Aridor Co., The, Chicago, Ill.
Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Crown Can Co., Phila., Pa.
Crown Cork & Seal Co., Baltimore, Md.
Ferguson, J. L. Co., Joliet, Ill.
Goat, Fred Co., Inc., The, Bklyn, N. Y.
Heekin Can Co., Cincinnati, Ohio
Horix Mfg. Co., Pittsburgh, Pa.
Kiefer, Karl Machine Co., The, Cincinnati, Ohio
Liquid Carbonic Corp., The, Chicago, Ill.
Pneumatic Scale Corp., Ltd., North Quincy, Mass.
Resina Automatic Machinery Co., Inc., Bklyn, N. Y.
Scientific Filter Co., New York, N. Y.
U. S. Automatic Box Machinery Co., Inc., Boston, Mass.
U. S. Bottlers Machinery Co., Chicago, Ill.
Williams Sealing Corp., Decatur, Ill.

MACHINES, CAPSULE WRAPPING

Ivers-Lee Co., Newark, N. J.
New Jersey Machine Corp., Hoboken, N. J.

MACHINES, CARTON FORMING, LINING, FILLING, FOLDING, CLOSING

Battle Creek Bread Wrapping Machine Co., Battle Creek, Mich.
Bostitch, Inc., East Greenwich, R. I.
Container Equipment Corp., Newark, N. J.
Ferguson, J. L. Co., Joliet, Ill.
National Metal Edge Box Co., Phila., Pa.
Pack-Rite Machines, Milwaukee, Wis.
Palmer, Frank D., Inc., Chicago, Ill.
Peters Machinery Co., Chicago, Ill.
Pneumatic Scale Corp., Ltd., North Quincy, Mass.
Redington, F. B. Co., Chicago, Ill.
Stokes & Smith Co., Phila., Pa.
Triangle Package Machinery Co., Chicago, Ill.
U. S. Automatic Box Machinery Co., Inc., Boston, Mass.

MACHINES, CARTON LOADING

Burt Machine Co., Baltimore, Md.
Container Equipment Corp., Newark, N. J.
Goat, Fred Co., Inc., The, Bklyn, N. Y.
Jeffrey Mfg. Co., The, Columbus, Ohio
Jones, R. A. Co., Covington, Ky.
Palmer, Frank D., Inc., Chicago, Ill.
Redington, F. B. Co., Chicago, Ill.
Standard-Knapp Corp., Portland, Conn.
Stokes & Smith Co., Phila., Pa.
U. S. Automatic Box Machinery Co., Inc., Boston, Mass.

MACHINES, CASE LOADING

Burt Machine Co., Baltimore, Md.
Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Container Equipment Corp., Newark, N. J.
Crown Cork & Seal Co., Baltimore, Md.
Ferguson, J. L. Co., Joliet, Ill.
Standard-Knapp Corp., Portland, Conn.

MACHINES, CASE PRINTING

Ferguson, J. L. Co., Joliet, Ill.
Hooper, F. X. Co., Inc., Glenarm, Md.
Langston, Samuel M. Co., Camden, N. J.
Standard-Knapp Corp., Portland, Conn.
Swift, G. W. Jr., Inc., Bordentown, N. J.

MACHINES, CASE SEALING
(Glue)

Dexter Folder Co., New York, N. Y.
Ferguson, J. L. Co., Joliet, Ill.
Palmer, Frank D., Inc., Chicago, Ill.
Standard-Knapp Corp., Portland, Conn.

MACHINES, CASE SEALING
(Gummed Tape)

Arenco Machine Co., Inc., New York, N. Y.
Better Packages, Inc., Shelton, Conn.
Gummed Tape & Devices Co., Bklyn, N. Y.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
Nashua Package Sealing Co., Inc., Nashua, N. H.
Rexford Paper Co., Milwaukee, Wis.
Seal, Inc., Shelton, Conn.

MACHINES, CASE STITCHING

Acme Staple Co., Camden, N. J.
Acme Steel Co., Chicago, Ill.
Bostitch, Inc., East Greenwich, R. I.
Globe Manufacturing Co., Philadelphia, Pa.
International Staple & Machine Co., Clifton Heights, Pa.
Saranac Machine Co., Benton Harbor, Mich.

MACHINES, CELLULOSE TUBE MAKING

Amsco Packaging Machinery, Inc., Long Island City, N. Y.
Hudson-Sharp Machine Co., Green Bay, Wis.
Knowlton, M. D. Co., Rochester, N. Y.
Potdevin Machine Co., Bklyn, N. Y.
Simplex Wrapping Machine Co., Oakland, Calif.
Stokes & Smith Co., Phila., Pa.

MACHINES, COATING
(Lacquer and Varnish)

Champlain Div., The Fred Goat Co., Inc., New York, N. Y.
Haida Engineering Co., Long Island City, N. Y.
Hudson-Sharp Machine Co., Green Bay, Wis.
Knowlton, M. D. Co., Rochester, N. Y.
Marconetti, A. E. Inc., New York, N. Y.
Potdevin Machine Co., Bklyn, N. Y.
Rotogravure Engineering Corp., East Boston, Mass.
Rutherford Machinery Co., Div. General Printing Ink Corp., New York, N. Y.
Waldron, John Corp., New Brunswick, N. J.

MACHINES, COATING WAX

Aeroil Burner Co., Inc., West New York, N. J.
Container Equipment Corp., Newark, N. J.
Gellman Mfg. Co., Rock Island, Ill.
Hudson-Sharp Machine Co., Green Bay, Wis.
International Paper Box Machine Co., The, Nashua, N. H.
Knowlton, M. D. Co., Rochester, N. Y.
Potdevin Machine Co., Bklyn, N. Y.
Richard Machine Co., Battle Creek, Mich.
Rotogravure Engineering Co., East Boston, Mass.
Standard-Knapp Corp., Portland, Conn.
Waldron, John Corp., New Brunswick, N. J.

MACHINES, COLLAPSIBLE TUBE
(Filling & Sealing)

Arenco Machine Co., Inc., New York, N. Y.
Colton, Arthur Co., Detroit, Mich.
Kiefer, Karl Machine Co., The, Cincinnati, Ohio
Stokes, F. J. Machine Co., Phila., Pa.

MACHINES, CORKING

Ermold, Edward Co., New York, N. Y.
Horix Mfg. Co., Pittsburgh, Pa.
Kiefer, Karl Machine Co., The, Cincinnati, Ohio
Pneumatic Scale Corp., Ltd., North Quincy, Mass.
Resina Automatic Machinery Co., Inc., Bklyn, N. Y.
U. S. Bottlers Machinery Co., Chicago, Ill.

MACHINES, COTTON INSERTING

Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Lakso Company, The, Fitchburg, Mass.
New Jersey Machine Corp., Hoboken, N. J.

MACHINES, COUNTING

Amsco Packaging Machinery Co., Long Island City, N. Y.
Ayers, John W. & Son, Bloomfield, N. J.
Colton, Arthur Co., Detroit, Mich.
Ferguson, J. L. Co., Joliet, Ill.
Redington, F. B. Co., Chicago, Ill.
Triangle Package Machinery Co., Chicago, Ill.
Veeder-Root, Inc., Hartford, Conn.

MACHINES, CRIMPING COLLAPSIBLE TUBE

Arenco Machine Co., Inc., New York, N. Y.
Colton, Arthur Co., Detroit, Mich.
Knowlton, M. D. Co., Rochester, N. Y.
Pack-Rite Machine Corp., Milwaukee, Wis.
Stokes, F. J. Machine Co., Phila., Pa.

MACHINES, CRIMPING & SEALING
(Heat Sealing Materials)

Amsco Packaging Machinery, Inc., Long Island City, N. Y.
Cleveland Crimping Press Co., Cleveland, Ohio
Food Packaging Div. of Milprint, Inc., Milwaukee, Wis.
Gump, B. F. Co., Chicago, Ill.
Heat Seal-It Co., Phila., Pa.
Ivers-Lee Co., Newark, N. J.
Miller Wrapping & Sealing Machine Co., Chicago, Ill.
Package Machinery Co., Springfield, Mass.
Pack-Rite Machines, Milwaukee, Wis.
Potdevin Machine Co., Bklyn, N. Y.
Simplex Wrapping Machine Co., Oakland, Calif.
Stokes & Smith Co., Phila., Pa.
Waldron, John Corp., New Brunswick, N. J.
Wells Mfg. Co., San Francisco, Calif.
Wrap-Ade Machine Co., Inc., Newark, N. J.

MACHINES, CRIMPING, SEAMING FIBRE CANS

Ams, Max Machine Co., Bridgeport, Conn.
Knowlton, M. D. Co., Rochester, N. Y.
Paslode Co., Chicago, Ill.

MACHINES, DIE CUTTING

Ayers, John W. & Son, Bloomfield, N. J.
Champlain Div., The Fred Goat Co., New York, N. Y.
Globe Mfg., Phila., Pa.
Goat, Fred Co., Inc., The, Bklyn, N. Y.
Harris-Seybold-Potter Co., Dayton, Ohio
Hulbert Engineering Corp., Watertown, Wis.
Lansky Die Cutting Co., New York, N. Y.
Palmer, Frank D. Inc., Chicago, Ill.
Potdevin Machine Co., Bklyn, N. Y.
Smith & Winchester Mfg. Co., S. Windham, Conn.
Staude, E. G. Mfg. Co., St. Paul, Minn.

MACHINES, DOMING
(Boxes)

Beck, Charles Machine Co., Phila., Pa.
Globe Mfg. Co., Phila., Pa.
Hulbert Engineering Corp., Watertown, Wis.
Knowlton, M. D. Co., Rochester, N. Y.
New Jersey Machine Corp., Hoboken, N. J.

MACHINES, EMBOSSING

Coughlin Manufacturing Co., New York, N. Y.
Force, Wm. A. & Co., Inc., Bklyn, N. Y.
Hudson-Sharp Machine Co., Green Bay, Wis.
Knowlton, M. D. Co., Rochester, N. Y.
Marconetti, A. E. Inc., New York, N. Y.
Markem Machine Co., Keene, N. H.
Paper Converting Machine Co., Green Bay, Wis.
Peerless Roll Leaf Co., Inc., Union City, N. J.
Potdevin Machine Co., Bklyn, N. Y.
Rotogravure Engineering Co., East Boston, Mass.
Rutherford Machinery Co., Div. of General Printing Ink Corp., New York, N. Y.
Waldron, John Corp., New Brunswick, N. J.

MACHINES, FIBRE CAN MAKING

Ferguson, J. L. Co., Joliet, Ill.
Hudson-Sharp Machine Co., Green Bay, Wis.
Hulbert Engineering Corp., Watertown, Wis.
Knowlton, M. D. Co., Rochester, N. Y.
Langston, Samuel M. Co., Camden, N. J.
Package Machinery Co., Springfield, Mass.

MACHINES, FILLING, DRY
(Gross and Net Weight)

Amsco Packaging Machinery, Inc., Long Island City, N. Y.
Arenco Machine Co., New York, N. Y.
Automatic Scale Co., Inc., New York, N. Y.
Battle Creek Bread Wrapping Machine Co., Battle Creek, Mich.
Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Exact Weight Scale Co., The, Columbus, Ohio
Ferguson, J. L. Co., Joliet, Ill.
Goat, Fred Co., Inc., The, Bklyn, N. Y.
Gump, B. F. Co., Chicago, Ill.
Miller Wrapping and Sealing Machine Co., Chicago, Ill.
Palmer, Frank D. Inc., Chicago, Ill.
Pneumatic Scale Corp., Ltd., North Quincy, Mass.
Richard Machine Co., Battle Creek, Mich.
St. Regis Paper Co., New York, N. Y.
Stokes, F. J. Machine Co., Phila., Pa.
Stokes & Smith Co., Phila., Pa.
Syntron Co., Homer City, Pa.
Toledo Scale Co., Toledo, Ohio
Triangle Package Machinery Co., Chicago, Ill.
U. S. Automatic Box Machinery Co., Inc., Boston, Mass.
Weigh Right Automatic Scale Co., Joliet, Ill.

MACHINES, FILLING, DRY
(Volumetric)

Amsco Packaging Machinery, Inc., Long Island City, N. Y.
Arenco Machine Co., New York, N. Y.
Automatic Scale Co., Inc., New York, N. Y.
Battle Creek Bread Wrapping Machine Co., Battle Creek, Mich.
Brown Bag Filling Machine Co., The, Fitchburg, Mass.
Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Ferguson, J. L. Co., Joliet, Ill.
Goat, Fred Co., Inc., The, Bklyn, N. Y.
Ivers-Lee Co., Newark, N. J.
Mojonnier Bros. Co., Chicago, Ill.
Palmer, Frank D. Inc., Chicago, Ill.
Peerless Products Mfg. Co., Detroit, Mich.
Pneumatic Scale Corp., Ltd., North Quincy, Mass.

Addresses of companies listed appear on pages 755–763

Stokes, F. J. Machine Co., Phila., Pa.
Stokes & Smith Co., Phila., Pa.
Syntron Co., Homer City, Pa.
Triangle Package Machinery Co., Chicago, Ill.
U. S. Automatic Box Machinery Co., Inc., Boston, Mass.
Weigh Right Automatic Scale Co., Joliet, Ill.
Wright's Automatic Machinery Co., Durham, N. C.

MACHINES, FILLING, LIQUID

Alsop Engineering Corp., Milldale, Conn.
Arenco Machine Co., Inc., New York, N. Y.
Colton, Arthur Co., Detroit, Mich.
Crown Cork & Seal Co., Baltimore, Md.
Food Machinery Corp., Sprague-Sells Div., Hoopeston, Ill.
Horix Manufacturing Co., Pittsburgh, Pa.
Kiefer, Karl Machine Co., The, Cincinnati, Ohio
Liquid Carbonic Corp., The, Chicago, Ill.
Mojonnier Bros. Co., Chicago, Ill.
Palmer, Frank D. Inc., Chicago, Ill.
Pneumatic Scale Corp., Ltd., North Quincy, Mass.
Scientific Filter Co., New York, N. Y.
U. S. Bottlers Machinery Co., Chicago, Ill.
Vol-U-Meter Co., The, Buffalo, N. Y.

MACHINES, FILLING, SEMI-LIQUID
(Viscose)

Arenco Machine Co., Inc., New York, N. Y.
Colton, Arthur Co., Detroit, Mich.
Crown Can Co., Phila., Pa.
Food Machinery Corp., Sprague-Sells Div., Hoopeston, Ill.
Horix Mfg. Co., Pittsburgh, Pa.
Kiefer, Karl Machine Co., The, Cincinnati, Ohio
Mojonnier Bros. Co., Chicago, Ill.
Palmer, Frank D. Inc., Chicago, Ill.
Pneumatic Scale Corp., Ltd., North Quincy, Mass.
Scientific Filter Co., New York, N. Y.
Stokes, F. J. Machine Co., Phila., Pa.
Stokes & Smith Co., Phila., Pa.
U. S. Bottlers Machinery Co., Chicago, Ill.
Vol-U-Meter Co., The, Buffalo, N. Y.

MACHINES, GUMMED TAPE

Better Packages, Inc., Shelton, Conn.
Ever Ready Label Corp., New York, N. Y.
Glue Fast Equipment Co., Inc., New York, N. Y.
Gummed Tape & Devices Co., Bklyn, N. Y.
Haida Engineering Co., Long Island City, N. Y.
Knowlton, M. D. Co., Rochester, N. Y.
Nashua Package Sealing Co., Inc., Nashua, N. H.
Potdevin Machine Co., Bklyn, N. Y.
U. S. Automatic Box Machinery Co., Inc., Boston, Mass.

MACHINES, LABEL GUMMING

Diagraph-Bradley Stencil Machine Corp., St. Louis, Mo.
Globe Manufacturing Co., Phila., Pa.
Glue Fast Equipment Co., Inc., New York, N. Y.
New Jersey Machine Corp., Hoboken, N. J.
Potdevin Machine Co., Bklyn, N. Y.
Stokes & Smith Co., Phila., Pa.
U. S. Bottlers Machinery Co., Chicago, Ill.
Waldron, John Corp., New Brunswick, N. J.

MACHINES, LABELERS

Alsop Engineering Corp., Milldale, Conn.
Arenco Machine Co., Inc., New York, N. Y.
Better Packages, Inc., Shelton, Conn.
Burt Machine Co., Baltimore, Md.
Economic Machinery Co., Worcester, Mass.
Ermold, Edward Co., New York, N. Y.
Ever Ready Label Corp., New York, N. Y.
Ferguson, J. L. Co., Joliet, Ill.
Food Machinery Corp., Sprague-Sells Div., Hoopeston, Ill.
Gellman Mfg. Co., Rock Island, Ill.
Globe Mfg. Co., Phila., Pa.
Glue Fast Equipment Co., Inc., New York, N. Y.
Liquid Carbonic Corp., The, Chicago, Ill.
New Jersey Machine Corp., Hoboken, N. J.
Oliver Machinery Co., Pkg. Div., Grand Rapids, Mich.
Package Machinery Co., Springfield, Mass.
Pneumatic Scale Corp., Ltd., North Quincy, Mass.
Potdevin Machine Co., Bklyn, N. Y.
Redington, F. B. Co., Chicago, Ill.
Scientific Filter Co., New York, N. Y.
Standard-Knapp Corp., Portland, Conn.
Stokes & Smith Co., Phila., Pa.
Wright's Automatic Machinery Co., Durham, N. C.

MACHINES, LABELING ATTACHMENTS

Amsco Packaging Machinery, Inc., Long Island City, N. Y.
Glue Fast Equipment Co., Inc., New York, N. Y.
Liquid Carbonic Corp., The, Chicago, Ill.
Miller Wrapping & Sealing Machine Co., Chicago, Ill.
New Jersey Machine Corp., Hoboken, N. J.
Oliver Machinery Co., Pkg. Div., Grand Rapids, Mich.
Package Machinery Co., Springfield, Mass.
Redington, F. B. Co., Chicago, Ill.
Simplex Wrapping Machine Co., Oakland, Calif.

MACHINES, LAMINATING

Champlain Div., The Fred Goat Co., Inc., New York, N. Y.
Haida Engineering Co., Long Island City, N. Y.
Henschel, C. B. Mfg. Co., Milwaukee, Wis.
Hudson-Sharp Machine Co., Green Bay, Wis.
Knowlton, M. D. Co., Rochester, N. Y.
Marconetti, A. E. Inc., New York, N. Y.
Meisel Press Mfg. Co., Boston, Mass.
Potdevin Machine Co., Bklyn, N. Y.
Rotogravure Engineering Corp., East Boston, Mass.
Waldron, John Corp., New Brunswick, N. J.

MACHINES, MARKING
(Box & Carton)

Ferguson, J. L. Co., Joliet, Ill.
Floquil Products, Inc., New York, N. Y.
Force, Wm. A. & Co., Inc., Bklyn, N. Y.
Marconetti, A. E. Inc., New York, N. Y.
Markem Machine Co., Keene, N. H.
Peerless Roll Leaf Co., Inc., Union City, N. J.
Standard-Knapp Corp., Portland, Conn.

MACHINES, METAL EDGE STAYING

National Metal Edge Box Co., Phila., Pa.

MACHINES, MILK BOTTLE HOODING

Aluminum Co. of America, Pittsburgh, Pa.
Aluminum Seal Co., New Kensington, Pa.
Crown Cork & Seal Co., The, Baltimore, Md.
Package Machinery Co., Springfield, Mass.
Sealright Co., Inc., Fulton, N. Y.

MACHINES, NUMBERING, PRINTING OR PERFORATING

American Perforator Co., The, Chicago, Ill.
Bates Mfg. Co., The, New York, N. Y.
Champlain Div., The Fred Goat Co., Inc., New York, N. Y.
Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Ferguson, J. L. Co., Joliet, Ill.
Force, Wm. A. & Co., Inc., Bklyn, N. Y.
Harris-Seybold-Potter Co., Dayton, Ohio
Markem Machine Co., Keene, N. H.
Meisel Press Mfg. Co., Boston, Mass.
New Jersey Machine Corp., Hoboken, N. J.
Oliver Machinery Co., Grand Rapids, Mich.
Potdevin Machine Co., Bklyn, N. Y.
Rotogravure Engineering Co., East Boston, Mass.

MACHINES, PACKET FILLING

Amsco Packaging Machinery, Inc., Long Island City, N. Y.
Arenco Machine Co., Inc., New York, N. Y.
Automatic Scale Co., Inc., New York, N. Y.
Brown Bag Filling Machine Co., The, Fitchburg, Mass.
Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Ferguson, J. L. Co., Joliet, Ill.
Gump, B. F. Co., Chicago, Ill.
Hulbert Engineering Corp., Watertown, Wis.
Redington, F. B. Co., Chicago, Ill.
Richard Machine Co., Battle Creek, Mich.
Stokes & Smith Co., Phila., Pa.
Triangle Package Machinery Co., Chicago, Ill.
U. S. Automatic Box Machinery Co. Inc., Boston, Mass.
Weigh Right Automatic Scale Co., Joliet, Ill.
Wright's Automatic Machinery Co., Durham, N. C.

MACHINES, PAPER BAG FEEDING, OPENING, WEIGHING & CLOSING
(Automatic)

Amsco Packaging Machinery Co., Long Island City, N. Y.
Arenco Machine Co., Inc., New York, N. Y.
Bemis Bro. Bag Co., St. Louis, Mo.
Consolidated Packaging Machinery Co., Buffalo, N. Y.
Gump, B. F. Co., Chicago, Ill.
Palmer, Frank D. Inc., Chicago, Ill.
Potdevin Machine Co., Bklyn, N. Y.
Redington, F. B. Co., Chicago, Ill.
Stokes & Smith Co., Phila., Pa.
St. Regis Paper Co., New York, N. Y.
Triangle Package Machinery Co., Chicago, Ill.
U. S. Automatic Box Machinery Co., Inc., Boston, Mass.
Weigh Right Automatic Scale Co., Joliet, Ill.

MACHINES, PAPER ROLL FEEDING

Cameron Machine Co., Brooklyn, N. Y.
Champlain Div., The Fred Goat Co., New York, N. Y.
Hudson-Sharp Machine Co., Green Bay, Wis.
Knowlton, M. D. Co., Rochester, N. Y.
Marconetti, A. E. Inc., New York, N. Y.
Modern Equipment Corp., Defiance, Ohio
Package Machinery Co., Springfield, Mass.
Palmer, Frank D. Inc., Chicago, Ill.
Paper Converting Machine Co., Green Bay, Wis.
Rotogravure Engineering Co., E. Boston, Mass.
Waldron, John Corp., New Brunswick, N. J.
Wright's Automatic Machinery Co., Durham, N. C.

MACHINES, PAPER SHREDDING

Industrial Shredder & Cutter Co., Salem, Ohio
Potdevin Machine Co., Bklyn, N. Y.
Waldron, John Corp., New Brunswick, N. J.

MACHINES, PARTITION ASSEMBLING

Hooper, F. X. Co., Inc., Glenarm, Md.
Inman Mfg. Co., Inc., Amsterdam, N. Y.
Standard-Knapp Corp., Portland, Conn.

MACHINES, PREFORMING & TABLETTING

Colton, Arthur Co., Detroit, Mich.
Stokes, F. J. Machine Co., Phila., Pa.

MACHINES, REVENUE STAMP

American Perforator Co., The, Chicago, Ill.
Arenco Machine Co., Inc., New York, N. Y.
New Jersey Machine Corp., Hoboken, N. J.
Package Machinery Co., Springfield, Mass.
Potdevin Machinery Co., Bklyn, N. Y.
Redington, F. B. Co., Chicago, Ill.
Wright's Automatic Machinery Co., Durham, N. C.

MACHINES, RIGID TRANSPARENT FABRICATING

Able Machine & Tool Works, New York, N. Y.
Camford Machine Corp., New York, N. Y.
Globe Mfg. Co., Phila., Pa.
Hulbert Engineering Corp., Watertown, Wis.
Knowlton, M. D. Co., Rochester, N. Y.
Stokes & Smith Co., Phila, Pa.
Taber Instrument Corp., N. Tonawanda, N. Y.

MACHINES, ROLL LEAF STAMPING

Couglin Mfg. Co., New York, N. Y.
Griffin, Campbell, Hayes, Walsh, Inc., New York, N. Y.
Markem Machine Co., Keene, N. H.
Peerless Roll Leaf Co., Inc., Union City, N. J.

MACHINES, ROLL SLITTERS & REWINDERS

Beck, Chas. Machine Co., Phila., Pa.
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Champlain Div., The Fred Goat Co., New York, N. Y.
Globe Mfg. Co., Phila., Pa.
Hudson-Sharp Machine Co., Green Bay, Wis.
Kidder Press Co., Inc., Dover, N. H.
Knowlton, M. D. Co., Rochester, N. Y.
Langston, Samuel M. Co., Camden, N. J.
Meisel Press Mfg. Co., Boston, Mass.
Potdevin Machine Co., Bklyn, N. Y.
Rotogravure Engineering Corp., E. Boston, Mass.
Waldron, John Corp., New Brunswick, N. J.

MACHINES, SHEET FEEDING

Hudson-Sharp Machine Co., Green Bay, Wis.
Marconetti, A. E. Inc., New York, N. Y.
New Jersey Machine Corp., Hoboken, N. J.
Package Machinery Co., Springfield, Mass.
Wright's Automatic Machinery Co., Durham, N. C.

MACHINES, SHEETING

Amsco Packaging Machinery, Inc., Long Island City, N. Y.
Beck, Chas. Machine Co., Phila., Pa.
Champlain Div., The Fred Goat Co., New York, N. Y.
Globe Mfg. Co., Phila., Pa.
Hudson-Sharp Machine Co., Green Bay, Wis.
Kidder Press Co., Inc., Dover, N. H.
Knowlton, M. D. Co., Rochester, N. Y.
Meisel Press Mfg. Co., Boston, Mass.
Miller Wrapping & Sealing Machine Co., Chicago, Ill.
Oliver Machinery Co., Pkg. Div., Grand Rapids, Mich.
Peters Machinery Co., Chicago, Ill.
Potdevin Machine Co., Bklyn, N. Y.
Rotogravure Engineering Co., East Boston, Mass.
Wrap-Ade Machine Co., Inc., Newark, N. J.

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Ferguson, J. L. Co., Joliet, Ill.
Knowlton, M. D. Co., Rochester, N. Y.
Langston, Samuel A. Co., Camden, N. J.
Paper Converting Machine Co., Green Bay, Wis.
Terkelsen Machine Co., Boston, Mass.

MACHINES, STACKING

Jeffrey Manufacturing Co., The, Columbus, Ohio
Rapids-Standard Co., Inc., The, Grand Rapids, Mich.

MACHINES, STAPLING

Acme Staple Co., Camden, N. J.
Acme Steel Co., Chicago, Ill.
Bostitch, Inc., East Greenwich, R. I.
Globe Manufacturing Co., Phila., Pa.
International Staple & Machine Co., Clifton Heights, Pa.
Paslode Co., Chicago, Ill.
Saranac Machine Co., Benton Harbor, Mich.

MACHINES, STATIC ELIMINATING

Kidder Press Co., Inc., Dover, N. H.
Potdevin Machine Co., Bklyn, N. Y.
Simco Co., The, Phila., Pa.

MACHINES, STENCIL CUTTING

Bradley, A. J. Mfg. Co., Long Island City, N. Y.
Diagraph-Bradley Stencil Machine Corp., St. Louis, Mo.
Ideal Stencil Machine Co., Racine, Wis.
Knowlton, M. D. Co., Rochester, N. Y.
Marsh Stencil Machine Co., Belleville, Ill.

MACHINES, STRIP COMBINING
(For Window Bags & Wrappers)

Cameron Machine Co., Bklyn, N. Y.
Potdevin Machine Co., Bklyn, N. Y.

MACHINES, TABLET COUNTING & PACKAGING

Arenco Machine Co., Inc., New York, N. Y.
Ayers, John W. & Son, Bloomfield, N. J.
Colton, Arthur Co., Detroit, Mich.
Hulbert Engineering Corp., Watertown, Wis.
Ivers-Lee Co., Newark, N. J.
Palmer, Frank D. Inc., Chicago, Ill.
Redington, F. B. Co., Chicago, Ill.
Stokes, F. J. Machine Co., Phila., Pa.
Stokes & Smith Co., Phila., Pa.
Triangle Package Machinery Co., Chicago, Ill.
U. S. Automatic Box Machinery Co., Inc., Boston, Mass.

MACHINES, TAPE SEALING

Better Packages, Inc., Shelton, Conn.
Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Ever Ready Label Corp., New York, N. Y.
Gummed Tape & Devices Co., Bklyn, N. Y.
Package Machinery Co., Springfield, Mass.
Vertex Co., New York, N. Y.

MACHINES, TIGHT WRAPPING
(For Carton Shells)

Pneumatic Scale Corp., Ltd., North Quincy, Mass.
Scandia Mfg. Co., No. Arlington, N. J.
Stokes & Smith Co., Phila., Pa.

MACHINES, TUBE LACQUERING, VARNISHING & PRINTING

Hudson-Sharp Machine Co., Green Bay, Wis.
Markem Machine Co., Keene, N. H.
Rutherford Machinery Co. Div., Gen. Printing Ink Corp., New York, N. Y.
Waldron, John Corp., New Brunswick, N. J.

MACHINES, UNSCRAMBLING

Burt Machine Co., Baltimore, Md.
Food Machinery Corp., Sprague-Sells Div., Hoopeston, Ill.
Horix Mfg. Co., Pittsburgh, Pa.
New Jersey Machine Corp., Hoboken, N. J.
Palmer, Frank D. Inc., Chicago, Ill.

MACHINES, VIBRATORS
(For Packing & Settling)

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Palmer, Frank D. Inc., Chicago, Ill.
Stokes & Smith Co., Phila., Pa.
Syntron Co., Homer City, Pa.

MACHINES, WINDING

Cameron Machine Co., Bklyn, N. Y.
Knowlton, M. D. Co., Rochester, N. Y.

MACHINES, WIRE STAPLING

Acme Staple Co., Camden, N. J.
Acme Steel Co., Chicago, Ill.
Bates Mfg. Co., The, New York, N. Y.
Bostitch, Inc., East Greenwich, R. I.
Globe Mfg. Co., Phila., Pa.
Harris-Seybold-Potter Co., Dayton, Ohio
Heller Co., The, Cleveland, Ohio
Ideal Stitcher & Mfg. Co., Racine, Wis.
International Staple & Machine Co., Clifton Heights, Pa.
Paslode Co., Chicago, Ill.
Saranac Machine Co., Benton Harbor, Mich.

MACHINES, WIRE STITCHING

Acme Steel Co., Chicago, Ill.
Bostitch, Inc., East Greenwich, R. I.
Dexter Folder Co., New York, N. Y.
Globe Mfg. Co., Phila., Pa.
Harris-Seybold-Potter Co., Dayton, Ohio
Heller Co., The, Cleveland, Ohio.
Ideal Stitcher & Mfg. Co., Racine, Wis.
Knowlton, M. D. Co., Rochester, N. Y.
Paslode Co., Chicago, Ill.
Saranac Machine Co., Benton Harbor, Mich.

MACHINES, WRAPPING

Amsco Packaging Machinery, Inc., Long Island City, N. Y.
Arenco Machine Co., Inc., New York, N. Y.
Battle Creek Bread Wrapping Machine Co., Battle Creek, Mich.
Gellman Mfg. Co., Rock Island, Ill.
Globe Mfg. Co., Phila., Pa.
Hayssen Mfg. Co., Sheboygan, Wis.
Hudson-Sharp Machine Co., Green Bay, Wis.
Ivers-Lee Co., Newark, N. J.
Johnson Automatic Sealer Co. Ltd., Battle Creek, Mich.
Lynch Mfg. Corp., Defiance, Ohio
Miller Wrapping & Sealing Machine Co., Chicago, Ill.

Addresses of companies listed appear on pages 755–763

Modern Equipment Corp., Defiance, Ohio
National Bread Wrapping Machine Co., Springfield, Mass.
Oliver Machinery Co. Pkg. Div., Grand Rapids, Mich.
Package Machinery Co., Springfield, Mass.
Pack-Rite Machines, Milwaukee, Wis.
Pneumatic Scale Corp., Ltd., North Quincy, Mass.
Potdevin Machine Co., Bklyn, N. Y.
Redington, F. B. Co., Chicago, Ill.
Richard Machine Co., Battle Creek, Mich.
Scandia Mfg. Co., No. Arlington, N. J.
Stokes & Smith Co., Phila., Pa.
Terkelsen Machine Co., Boston, Mass.
U. S. Automatic Box Machinery Co., Inc., Boston, Mass.
Wright's Automatic Machinery Co., Durham, N. C.

MARKING EQUIPMENT

Dennison Manufacturing Co., Framingham, Mass.
Ferguson, J. L. Co., Joliet, Ill.
Floquil Products, Inc., New York, N. Y.
Force, Wm. A. & Co., Inc., Bklyn, N. Y.
Markem Machine Co., Keene, N. H.
Peerless Roll Leaf Co., Inc., Union City, N. J.

PRESSES, PRINTING
(Aniline)

Champlain Div., The Fred Goat Co., New York, N. Y.
Cottrell, C. B. & Sons Co., Claybourn Div., Milwaukee, Wis.
Haida Engineering Co., Long Island City, N. Y.
Heinrich, H. H. Inc., New York, N. Y.
Henschel, C. B. Mfg. Co., Milwaukee, Wis.
Hudson-Sharp Machine Co., Green Bay, Wis.
Kidder Press Co., Inc., Dover, N. H.
Marconetti, A. E. Inc., New York, N. Y.
Meisel Press Mfg. Co., Boston, Mass.
Potdevin Machine Co., Bklyn, N. Y.
Rotogravure Engineering Co., E. Boston, Mass.
Rutherford Machinery Co., Div. General Printing Ink Corp., New York, N. Y.
Staude, E. G. Mfg. Co., St. Paul, Minn.
Waldron, John Corp., New Brunswick, N. J.

PRESSES, PRINTING
(Letterpress)

Champlain Div., The Fred Goat Co., New York, N. Y.
Cottrell, C. B. & Sons Co., Claybourn Div., Milwaukee, Wis.
Harris-Seybold-Potter Co., Dayton, Ohio
Hooper, F. X. Co., Glenarm, Md.
Hudson-Sharp Machine Co., Green Bay, Wis.
Kidder Press Co., Inc., Dover, N. H.
Markem Machine Co., Keene, N. H.
Meisel Press Mfg. Co., Boston, Mass.
Miehle Printing Press Mfg. Co., Chicago, Ill.
Miller Printing Machinery Co., Pittsburgh, Pa.
Potdevin Machine Co., Bklyn, N. Y.
Rotogravure Engineering Co., E. Boston, Mass.
Rutherford Machinery Co., Div. General Ptg. Ink Corp., New York, N. Y.
Staude, E. G. Mfg. Co., St. Paul., Minn.
Stokes & Smith Co., Phila., Pa.

PRESSES, PRINTING
(Lithographic)

Harris-Seybold-Potter Co., Dayton, Ohio
Hoe, R. & Co., Inc., New York, N. Y.
Kidder Press Co., Inc., Dover, N. H.
Meisel Press Mfg. Co., Boston, Mass.
Miehle Printing Press Mfg. Co., Chicago, Ill.
Rutherford Machinery Co., Div. Gen. Ptg. Ink Corp., New York, N. Y.
Webendorfer-Wills Co., Div. American Type Founders Sales Corp., Mt. Vernon, N. Y.

PRESSES, PRINTING
(Raised)

Meisel Press Mfg. Co., Boston, Mass.
Rotogravure Engineering Co., E. Boston, Mass.
Waldron, John Corp., New Brunswick, N. J.

PRESSES, PRINTING
(Rotogravure)

Champlain Div., The Fred Goat Co., New York, N. Y.
Cottrell, C. B. & Sons Co., Claybourn Div., Milwaukee, Wis.
Goss Printing Press Co., Chicago, Ill.
Harris-Seybold-Potter Co., Dayton, Ohio
Hoe, R. & Co., New York, N. Y.
Hudson-Sharp Machine Co., Green Bay, Wis.
Kidder Press Co., Inc., Dover, N. H.
Marconetti, A. E. Inc., New York, N. Y.
Meisel Press Mfg. Co., Boston, Mass.
Potdevin Machine Co., Bklyn, N. Y.
Rotogravure Engineering Co., E. Boston, Mass.
Staude, E. G. Mfg. Co., St. Paul, Minn.
Waldron, John Corp., New Brunswick, N. J.

SCALES, AUTOMATIC CHECK WEIGHERS

Amsco Packaging Machinery, Inc., Long Island City, N. Y.
Arenco Machine Co., Inc., New York, N. Y.
Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Detecto Scales, Inc., Bklyn, N. Y.
Exact Weight Scale Co., The, Columbus, Ohio
Goat, Fred Co., Inc., The, Bklyn, N. Y.
Gump, B. F. Co., Chicago, Ill.
Howe Scale Co., The, Rutland, Vt.
Merrick Scale Mfg. Co., Passaic, N. J.
Pneumatic Scale Corp., Ltd., North Quincy, Mass.
Stokes & Smith Co., Phila., Pa.
Toledo Scale Co., Toledo, Ohio
Triangle Package Machinery Co., Chicago, Ill.
Weigh Right Automatic Scale Co., Joliet, Ill.

SCALES, CONVEYOR

Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Exact Weight Scale Co., The, Columbus, Ohio
Toledo Scale Co., Toledo, Ohio
Triangle Package Machinery Co., Chicago, Ill.

SCALES, FREIGHT, EXPRESS (COMPUTING)

Detecto Scales, Inc., Bklyn, N. Y.
Exact Weight Scale Co., The, Columbus, Ohio
Howe Scale Co., The, Rutland, Vt.
Toledo Scale Co., Toledo, Ohio

SCALES, OVER & UNDER WEIGHT

Arenco Machine Co., Inc., New York, N. Y.
Detecto Scales, Inc., Bklyn, N. Y.
Exact Weight Scale Co., The, Columbus, Ohio
Howe Scale Co., The, Rutland, Vt.
Merrick Scale Mfg. Co., Passaic, N. J.
Thwing-Albert Instrument Co., Phila., Pa.
Toledo Scale Co., Toledo, Ohio

SCALES, WEIGHING & FILLING

Amsco Packaging Machinery, Inc., Long Island City, N. Y.
Battle Creek Bread Wrapping Machine Co., Battle Creek, Mich.
Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Exact Weight Scale Co., Columbus, Ohio
Ferguson, J. L. Co., Joliet, Ill.
Pneumatic Scale Corp., Ltd., North Quincy, Mass.
Stokes & Smith Co., Phila., Pa.
Toledo Scale Co., Toledo, Ohio
Triangle Package Machinery Co., Chicago, Ill.
U. S. Automatic Box Machinery Co., Inc., Boston, Mass.
Vol-U-Meter Co., The, Buffalo, N. Y.
Weigh Right Automatic Scale Co., Joliet, Ill.
Wright's Automatic Machinery Co., Durham, N. C.

SCALES, WEIGHT PRINTING

Toledo Scale Co., Toledo, Ohio

SPRAYERS

Aeroil Burner Co., Inc., West New York, N. J.
Bronzart Metals Co., New York, N. Y.
Federal Tool Corp., Chicago, Ill.
Glass Industries, Inc., New York, N. Y.
R. C. Can Co., St. Louis, Mo.
Scovill Mfg. Co., Waterbury, Conn.
Wilco Co., Los Angeles, Calif.

SERVICES SECTION

CUSTOM PACKAGERS

Gesell, R. Inc., New York, N. Y.
House of Price, New York, N. Y.
Jamieson, C. E. & Co., Detroit, Mich.
Peerless Packers, New York, N. Y.
Ray, Ellen Laboratories, Bklyn., N. Y.
Strong Cobb & Co., Inc., Cleveland, Ohio
Trans-Pac Services, Inc., New York, N. Y.
Vitapak Co., New York, N. Y.
Wilco Co., Los Angeles, Calif.

FINISHERS, CUSTOM
(Lacquers & Varnishes)

Lowery & Schwartz, New York, N. Y.
McCoy Paper Converters, Phila., Pa.
Mor-Gan Laminating & Foliating Co., New York, N. Y.
Paragon Plastics, Inc., Seattle, Wash.
Pyrotex Leather Co., Leominster, Mass.
Riegel Paper Corp., New York, N. Y.
U. S. Finishing & Mfg. Co., Chicago, Ill.
Wiener Bros., Inc., New York, N. Y.

DISPLAY MOUNTING AND FINISHING

Arvey Corp., Chicago, Ill., & Jersey City, N. J.
Badger Carton Co., Milwaukee, Wis.
Bronzart Metals Co., New York, N. Y.
Central Lithograph Co., The, Cleveland, Ohio
Chaspec Mfg. Co., New York, N. Y.
Display Finishing Co., Inc., Long Island City, N. Y.

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Merit Display Card Co., New York, N. Y.
Plastics Finishers Corp., Bklyn, N. Y.
Printloid, Inc., New York, N. Y.
Schmidt Litho. Co., San Francisco, Calif.
Schoettle, Edwin J. Co., Phila., Pa.
U. S. Finishing & Mfg. Co., Chicago, Ill.
Warneke Paper Box Co., Denver, Colo.

EMBOSSING, CUSTOM

Anderson, A. J. Co., Chicago, Ill.
Buckley, C. E. Co., Leominster, Mass.
Central Lithograph Co., The, Cleveland, Ohio
Lansky Die Cutting Co., New York, N. Y.
Peerless Roll Leaf Co., Inc., Union City, N. J.
Riegel Paper Corp., New York, N. Y.
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U. S. Finishing & Mfg. Co., Chicago, Ill.
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Alexander, Jerome, New York, N. Y.
Analytical Laboratory, The, Jersey City, N. J.
Bowser-Morner Testing Laboratories, Dayton, Ohio
California Testing Laboratories, Los Angeles, Calif.
Columbus Laboratories, The, Chicago, Ill.
Container Testing Laboratories, Inc., New York, N. Y.
Detroit Testing Laboratory, The, Detroit, Mich.
Dumas Laboratory, The, Atlanta, Ga.
Laucks Laboratories, Inc., Seattle, Wash.
LaWall and Harrisson, Phila., Pa.
Little, Arthur D. Inc., Cambridge, Mass.
Los Angeles Testing Laboratory, Los Angeles, Calif.
Maffitt, Howard C., Des Moines, Ia.
National Canners' Laboratory, Pittsburgh, Pa.
New York Testing Laboratories, New York, N. Y.
Northwest Testing Laboratories, Seattle, Wash.
Osborne, Raymond G. Laboratories, Los Angeles, Calif.
Package Materials Laboratories Co., Long Island City, N. Y.
Pitkin, Lucius Inc., New York, N. Y
Pittsburgh Testing Laboratory, Pittsburgh, Pa.
Quinn, Don L. Co., The, Chicago Ill.
Smith-Emery Co., Los Angeles, Calif.
Smith-Emery & Co., San Francisco, Calif.
Twining Laboratories, The, Fresno, Calif.
United States Testing Co., Inc., Hoboken, N. J.

LAMINATING, CUSTOM

Arvey Corp., Chicago, Ill., & Jersey City, N. J.
Butterfield-Barry Co., New York, N. Y.
Deerfield Glassine Co., Monroe Bridge, Mass.
Dobeckmun Co., The, Cleveland, Ohio
General Felt Products, Inc., Bklyn, N. Y.
General Laminating, Inc., New York, N. Y.
Interstate Folding Box Co., Middletown, Ohio
Jaypaco Co., New York, N. Y.
Laminating Corp., Chicago, Ill.
Laminoid, Inc., North Bergen, N. J.
McLaurin-Jones Co., Brookfield, Mass.
Mor-Gan Laminating & Foliating Co., New York, N. Y.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
National Water-Proofing Co., Camden, N. J.
New York Laminating Co., Irvington, N. J.
Paragon Plastics, Inc., Seattle, Wash.
Plastics Finishing Corp., Bklyn, N. Y.
Port Huron Sulphite & Paper Co., Port Huron, Mich.
Reynolds Metals Co., Richmond, Va.
Riegel Paper Corp., New York, N. Y.
Salwen, Joe Paper Co., New York, N. Y.
Shellmar Products Co., Mt. Vernon, Ohio
Shoup-Owens, Inc., Hoboken, N. J.
U. S. Finishing & Mfg. Co., Chicago, Ill.
United Mfg. Co., Springfield, Mass.
Walser Mfg. Co., The, Clifton, N. J.
Westfield River Paper Co., Inc., Russell, Mass.

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Continental Lithograph Corp., Cleveland, Ohio
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Fleming-Potter Co., Peoria, Ill.
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Gamse Lithographing Co., Inc., Baltimore, Md.
General Felt Products, Inc., Bklyn, N. Y.
Grammes, L. F. & Sons, Inc., Allentown, Pa.
Howell, F. M. & Co., Grand Rapids, Mich.
Kaumagraph Co., Wilmington, Del.
Kindred, MacLean & Co., Inc., Long Island City, N. Y.
Lebanon Paper Box Co., Lebanon, Pa.
Lehman Printing & Litho. Co., San Francisco, Calif.
Magill-Weinsheimer Co., Chicago, Ill.
Mandus Co., Inc., New York, N. Y.
McCandish Lithograph Corp., Phila., Pa.
Michigan Litho. Co., Grand Rapids, Mich.
Milprint, Inc., Milwaukee, Wis.
Nalco Inc., New York, N. Y.
National Color Printing Co., Inc., The, Baltimore, Md.
National Printing & Engraving Co., Chicago, Ill.
National Process Co., New York, N. Y.
Niagara Lithograph Co., Buffalo, N. Y.
Oberly & Newell Lithograph Corp., New York, N. Y.
Penn Lithographing Co., Phila., Pa.
Pictorial Paper Package Corp., Aurora, Ill.
Progress Lithographing Co., The, Reading, Ohio
Reynolds Metals Co. Richmond, Va.
Rode & Brand, New York, N. Y.
Roesch, Louis Co., San Francisco, Calif.
Roman, Martin L. Co., The, New York, N. Y.
Rossotti Lithographing Co., North Bergen, N. J.
Roto-Lith, Ltd., New York, N. Y.
Schmidt Lithograph Co., San Francisco, Calif.
Stecher-Traung Lithograph Corp., Rochester, N. Y.
Strobridge Lithographing Co., The, Cincinnati, Ohio
Sutherland Paper Co., Kalamazoo, Mich.
Trade Lithograph & Printing Co., Inc., New York, N. Y.
Trautmann, Bailey & Blampey, New York, N. Y.
U. S. Printing & Lithograph Co., The, Norwood, Cincinnati, Ohio
Waddill Printing & Lithographing Co., Danville, Va.
Wilmanns Bros. Co., Milwaukee, Wis.
Zipprodt, Inc., Chicago, Ill.

MOLDERS, PLASTIC

Ability Mold & Die Works, Chicago, Ill.
Accessories Mfg. Co., Kansas City, Mo.
Accurate Molding Corp., Bklyn, N. Y.
Ackerman Plastic Molding, Cleveland, Ohio
Acraglas Co., The, Santa Monica, Calif.
Adler Engineering Co., Hackettstown, N. J.
Advance Molding Corp., New York, N. Y.
Alden Prods. Co., Brockton, Mass.
All American Aircraft Prods., Inc., Long Beach, Calif.
Allied Barrel Corp., Oil City, Pa.
Allied Plastics Co., Los Angeles, Calif.
American Denture Corp., Portland, Ore.
American Insulator Corp., New Freedom, Pa.
American Molded Products Co., Chicago, Ill.
American Molding Co., San Francisco, Calif.
Amos-Thompson Corp., Edinburgh, Ind.
Armstrong Cork Co., Lancaster, Pa.
Arpin Prods., Inc., Orange, N. J.
Arrow Plastics Corp., Passaic, N. J.
Artisan Plastic Moulding Co., Trenton, N. J.
Atlantic Plastic & Metal Parts Co., Cleveland, Ohio
Atlantic Plastics, Inc., Woodside, N. Y.
Atlas Appliance Corp., Bklyn, N. Y.
Atlas Plastic Mfg. Co., Inc., Lynbrook, L. I., N. Y.
Auburn Button Works, Inc., Auburn, N. Y.
Automatic Plastic Prods., Emeryville, Calif.
Bachmann Bros., Inc., Phila., Pa.
Baker, Willoughby, Oakland, Calif.
Barber Colman Co., Molded Prods. Div., Rockford, Ill.
Barnes Plastic Co., Los Angeles, Calif.
Bay State Moulding Co., Boston, Mass.
Beaman Molded Prods. Co., Portland, Ore.
Bergwood Molding Co., Kansas City, Mo.
Berkander, Geo. F. Inc., Providence, R. I.
Bolta Co., The, Lawrence, Mass.
Boonton Molding Co., Boonton, N. J.
Breyer Molding Co., Chicago, Ill.
Bridgeport Moulded Prods., Inc., Bridgeport, Conn.
Brill-Monfort Co., Inc., Bklyn, N. Y.
Brogan, Byard F., Phila., Pa.
Bryant Electric Co., Bridgeport, Conn.
Burton Mfg. Co., Chicago, Ill.
Butterfield, T. F. Inc., Naugatuck, Conn.
Button Corp. of America, Newark, N. J.
Caldwell Prods., Inc., New York, N. Y.
California Pacific Plastic Co., Los Angeles, Calif.
California Plastic Moulding Co., Los Angeles, Calif.
California Plastics Co., San Francisco, Calif.
Capac Mfg. Co., Capac, Mich.
Cardinal Corp., The, Evansville, Ind.
Celluplastic Corp., Newark, N. J.
Central Die Casting & Mfg. Co., Chicago, Ill.

Addresses of companies listed appear on pages 755–763

Central Machine Works Co., Minneapolis, Minn.
Chicago Die Mold Mfg. Co., Chicago, Ill.
Chicago Molded Products Corp., Chicago, Ill.
Chicago Plastic Mfg. Co., Chicago, Ill.
Cinch Mfg. Corp., Chicago, Ill.
Cincinnati Advertising Prods. Co., Cincinnati, Ohio
Cincinnati Molding Co., Cincinnati, Ohio
Claremould Plastics Co., Newark, N. J.
Cleveland Plastics, Inc., Cleveland, Ohio
Climax Mfg. & Molding Corp., Canton, Ohio
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.
Columbia Protektosite Co., Inc., Carlstadt, N. J.
Columbus Plastic Products Co., Inc., Columbus, Ohio
Commonwealth Plastic Co., Leominster, Mass.
Compo-Site, Plastics Div., Lowe, E. S. Co. Inc., Paterson, N. J.
Connecticut Hard Rubber Co., New Haven, Conn.
Connecticut Plastic Prods. Co., Waterbury, Conn.
Consolidated Molded Products Corp., Scranton, Pa.
Continental Plastics Corp., Chicago, Ill.
Craven-Whittaker Co., Providence, R. I.
Cruver Mfg. Co., Chicago, Ill.
Cutler-Hammer, Inc., Milwaukee, Wis.
D & W Tool Co., Glendale, Cal.
Davies, Harry Molding Co., Chicago, Ill.
Dayton Insulating Molding Co., Dayton, Ohio
Designs, Inc., North Bergen, N. J.
Detroit Macoid Corp., Detroit, Mich.
Diemolding Corp., Canastota, N. Y.
Dillon-Beck Mfg. Co., Irvington, N. J.
Dimco Plastics, Dayton, Ohio
Drell Novelty Mfg. Co., New York, N. Y.
Eagle Plastics Corp., Long Island City, N. Y.
Eastern Plastics Prods. Corp., Pittsburgh, Pa.
Eby, Hugh H. Inc., Phila., Pa.
Eclipse Moulded Products Co., Milwaukee, Wis.
Economy Fuse & Mfg. Co., Chicago, Ill.
Electric Auto-Lite Co., Bay Mfg. Div., Bay City, Mich.
Emeloid Co., Inc., Arlington, N. J.
Erie Plastics Co., Erie, Pa.
Erie Resistor Corp., Erie, Pa.
Essex Corp., Charlottesville, Va.
Eureka Button Co., New York, N. Y.
Federal Tool Corp., Chicago, Ill.
Firestone Rubber & Latex Products Co., Fall River, Mass.
Foster-Grant Co., Inc., Leominster, Mass.
Franklin Plastics Div., Robinson Industries, Inc., Franklin, Pa.
Gardner Taubes Corp., New York, N. Y.
Garfield Mfg. Co., Garfield, N. J.
Gemloid Corp., Elmhurst, L. I., N. Y.
General Electric Co., Plastics Dept., Pittsfield, Mass.
General Industries Co., Elyria, Ohio
General Insulate Co., Inc., Bklyn, N. Y.
General Molded Prods., Inc., Des Plaines, Ill.
General Molding Co., Rockledge, Pa.
General Prods. Corp., Union Springs, N. Y.
Gesler Jewelry Co., Providence, R. I.
Gibbs Mfg., Berkeley, Calif.
Gits Molding Corp., Chicago, Ill.
Globe Tool & Molded Prods. Co., Rockford, Ill.
Golden Gate Mfg. Co., Oakland, Calif.
Grammes, L. F. & Sons, Inc., Allentown, Pa.
Great American Plastics Co., Leominster, Mass.
Grigoleit Co., The, Decatur, Ill.
Grimes Mfg. Co., Urbana, Ohio
Grotelite Co., Inc., The, Bellevue, Ky.
Guilliksen, W. M. Mfg. Co., Newton Lower Falls, Mass.
Haas Corp., The, Mendon, Mich.
Hodgman Rubber Co., Framingham, Mass.
Hyde, A. L. Co., Grenloch, N. J.
Ideal Novelty & Toy Co., Long Island City, N. Y.
Illini Molded Plastics, Hinsdale, Ill.
Imperial Molded Products Corp., Chicago, Ill.
Industrial Molded Prods. Co., Chicago, Ill.
Ingwersen Mfg. Co., Denver, Colo.
Injection Molding Co., Kansas City, Mo.
Injection Molding Corp., New York, N. Y.
Inland Mfg. Div., General Motors Corp., Dayton, Ohio
Insel Co., Arlington, N. J.
Instaset Plastics Div., Evans-Winter-Hebb, Inc., Detroit, Mich.
Insulation Mfg. Co., Inc., Bklyn, N. Y.
Insulation Prods. Co., Pittsburgh, Pa.
International Molded Plastics, Inc., Cleveland, Ohio
Jamison, H., Freeport, L. I., N. Y.
Kampa Mfg. Co., Milwaukee, Wis.
K. C. Plastic Fabricators, Kansas City, Mo.
Keasbey & Mattison, Ambler, Pa.
Keeler Brass Co., Grand Rapids, Mich.
Kellogg Switchboard & Supply Co., Chicago, Ill.
Keolyn Plastics Co., Chicago, Ill.
Keystone Specialty Co., Cleveland, Ohio
Kilgore Mfg. Co., The (Plastics Div.), Westerville, Ohio
King Plastic Corp., Denver, Colo.
Kingman, E. B. Co., Leominster, Mass.
Kirk, F. J. Molding Co., Clinton, Mass.
Kling Bros. Eng. Works, Chicago, Ill.
Kuhn & Jacob Moulding & Tool Co., Trenton, N. J.
Kurz-Kasch, Inc., Dayton, Ohio
Lanfare Molded Prods., Toledo, Ohio
Lapin Prods., Inc., Newark, N. J.
Leviton Mfg. Co., Bklyn, N. Y.
Lindenhurst Mfg. Co., Inc., Lindenhurst, N. Y.
Mack Molding Co., Wayne, N. J.
Martindell Molding Co., Trenton, N. J.
Maryland Plastics, Inc., Federalsburg, Md.
Mason, Thomas Co., Inc., The, Stamford, Conn.
Master Plastic Molding Corp., St. Louis, Mo.
Master Tool & Die Makers, New York, N. Y.
McDonald Mfg. Co., Los Angeles, Calif.
McInerney Plastics Co., Grand Rapids, Mich.
Mechanical Institute, Boonton, N. J.
Meissner Mfg. Co., Carmel, Ill.
Metal Specialty Co., The, Cincinnati, Ohio
Micamold Radio Corp., Bklyn, N. Y.
Michigan Molded Plastics, Inc., Dexter, Mich.
Mico, Inc., Millerton, N. Y.
Midwest Molding & Mfg. Co., Chicago, Ill
Mill-O-Plast Co., New York, N. Y.
Mills, Elmer E. Corp., Chicago, Ill.
Minneapolis Plastic Co., Minneapolis, Minn.
Minnesota Plastics Corp., St. Paul, Minn.
Modern Machine Corp., Bklyn, N. Y.
Modern Plastic Co., Los Angeles, Calif.
Modern Plastics Corp., Benton Harbor, Mich.
Modglin Co., Los Angeles, Calif.
Molded Insulation Co., Phila., Pa.
Molded Prods. Co., Chicago, Ill.
Molding Corp. of America, Inc., Pawtucket, R. I.
Monoplastics, Inc., Georgetown, Conn.
Morrell, George Corp., Muskegon Heights, Mich.
National Lock Co., Rockford, Ill.
National Organ Supply Co., Erie, Pa.
National Plastics, Inc., Knoxville, Tenn.
New England Novelty Co., Leominster, Mass.
New Products Corp., Benton Harbor, Mich.
Niagara Insul-Bake Specialty Co., Inc., Albany, N. Y.
Northeastern Molding, Inc., Pawtucket, R. I.
Northeastern Plastics Corp., Boston, Mass.
Northern Industrial Chem. Co., So. Boston, Mass.
Northwest Plastics, Inc., St. Paul, Minn.
Norton Laboratories, Inc., Lockport, N. Y.
Ohio Plastic Co., The, Frazeyburg, Ohio
Oris Mfg. Co., Inc., Thomaston, Conn.
O'Shei, B. F., Buffalo, N. Y.
Owens-Illinois Glass Co., Toledo, Ohio
Paragon Plastics, Inc., Seattle, Wash.
Patent Button Co. of Tenn., The, Knoxville, Tenn.
Paulis, H. Plastic Co., Los Angeles, Calif.
Peerless Molded Plastics, Toledo, Ohio
Perfection Plastic Prods., East Newark, N. J.
Pittsburgh Plastics Co., Inc., New Kensington, Pa.
Place, Roland P. Co., Midland, Mich.
Plano Molding Co., Plano, Ill.
Plastal Specialties Co., Seattle, Wash.
Plas-Tex Corp., Los Angeles, Calif.
Plastic & Die Cast Prods. Corp., Los Angeles, Calif.
Plastic Engineering Inc., Cleveland, Ohio
Plastic & Rubber Prods. Co., Los Angeles, Calif.
Plastic Co., Inc., Los Angeles, Calif.
Plastic Industries, Inc., Bedford, Ohio
Plastic Manufacturers, Inc., Stamford, Conn.
Plastic Molded Arts, Inc., Long Island City, N. Y.
Plastic Molding Corp., Sandy Hook, Conn.
Plastic Moldings Corp., Cincinnati, Ohio
Plastic Products, Inc., Detroit, Mich.
Plastic Products, Inc., New York, N. Y.
Plastic Research Foundation, Brookline, Mass.
Plastic-Ware, Inc., New York, N. Y.
Plasticraft Associates, Chicago, Ill.
Plastics, Inc., St. Paul, Minn.
Plastics, Inc., Bradley Beach, N. J.
Plastics Engineering Co., Sheboygan, Wis.
Plastics Engineering, Inc., Cleveland, Ohio
Plastimold, Inc., Attleboro, Mass.
Poinsettia, Inc., Pitman, N. J.
Potter & Brumfield Mfg. Co., Inc., Princeton, Ind.
Precision Molded Plastics, Inc., Cleveland, Ohio
Precision Plastics Co., Phila., Pa.
Pro-phy-lac-tic Brush Co., Florence, Mass.
Pyro Plastics Co., Westfield, N. J.
Racine Universal Motor Co., Racine, Wis.
Rathbun Molding Corp., Salamanca, N. Y.
Raymond Laboratories, Inc., St. Paul, Minn.
Recto Molded Prods., Inc., Cincinnati, Ohio
Reinhold, F. E. Co., Los Angeles, Calif.
Remler Co., Ltd., San Francisco, Calif.
Resistoflex Corp., Belleville, N. J.
Reynolds Spring Co., Molded Plastics Div., Cambridge, Ohio
Richardson Co., The, Chicago, Ill.
Robinson-Spear Corp., New York, N. Y.
Rogan Bros., Chicago, Ill.
Rogers, V. F., Denver, Colo.
Royal Moulding Co., Providence, R. I.
Safe-ty Socket Co., Gibson City, Ill.
St. Louis Plastic Moulding Co., St. Louis, Mo.
Salz Bros., Inc., New York, N. Y.
Sav-Way Industries, Detroit, Mich.
Schwab & Frank, Inc., Detroit, Mich.
Scott, Geo. S. Mfg. Co., The, Plantsville, Conn.
Seder & Son Molded Prods. Co., Fort Collins, Colo.
Seymour's & Co., Chicago, Ill.
Shaw Insulator Co., Irvington, N. J.
Sheller Mfg. Corp., Portland, Ind.
Shepherd, J. H. Son & Co., Elyria, Ohio
Sinko Tool & Mfg. Co., Chicago, Ill.
Smith, Frank B. Molding Co., Chicago, Ill.
Sobenite, Inc., So. Bend, Ind.

Southern Plastics Co., Columbia, S. C.
Southwest Machine & Plastic Co., Los Angeles, Calif.
Specialty Insulation Mfg. Co., Inc., Hoosick Falls, N. Y.
Standard Cap & Molding Co., Inc., Baltimore, Md.
Standard Electric Mfg. Co., Chicago, Ill.
Standard Novelty Box Co., New York, N. Y.
Standard Plastics Co., Attleboro, Mass.
Standard Prods. Co., The, Thermo-Plastic Div., Detroit, Mich.
Sterling Injection Molding, Inc., Buffalo, N. Y.
Sterling Plastics Co., Union, N. J.
Stokes, Jos. Rubber Co., Trenton, N. J.
Style Molders, Inc., Bklyn, N. Y.
Sulak Mfg. Co., Seattle, Wash.
Superior Plastic Co., Chicago, Ill.
Synthetic Moulded Prods., Inc., Wakefield, R. I.
Synthetic Plastics Co., Newark, N. J.
Tech-Art Plastics Co., Long Island City, N. Y.
Telex Prods. Co., Minneapolis, Minn.
Terkelsen Machine Co., Boston, Mass.
Ther Electric & Machine Works, Chicago, Ill.
Tight Closure Co., Milwaukee, Wis.
Tilton & Cook Co., Leominster, Mass.
Titan Plastic Prods. Co., Los Angeles, Calif.
Toledo Plastics Co., Toledo, Ohio
Trenton Metals & Plastics Co., Trenton, N. J.
Tri-State Plastic Molding Co., Henderson, Ky.
Tupper Plastics, Farnumsville, Mass.
Uncas Mfg. Co., Providence, R. I.
Union Insulating Co., Parkersburg, W. Va.
United Comb & Novelty Co., Inc., Leominster, Mass.
United Plastics Corp., Cleveland, Ohio
Universal Button Fastening & Button Co., Detroit, Mich.
Universal Plastics Corp., New Brunswick, N. J.
Van Norman Molding Co., Chicago, Ill.
Victor Mfg. & Gasket Co., Chicago, Ill.
Victor Metal Products Corp., Bklyn, N. Y.
Victory Button Co., Inc., Leominster, Mass.
Vichek Tool Co., The, Plastics Div., Cleveland, Ohio
Voges Mfg. Co., The, Ozone Park, L. I., N. Y.
Vulcanized Rubber Co., The, New York, N. Y.
Walco Plastics Co., E. Orange, N. J.
Ward Plastic & Rubber Co., Rochester, N. Y.
Warren Plastics Corp., Warren, Pa.
Washington Molding Co., Inc., Port Washington, N. Y.
Waterbury Companies, Inc., Waterbury, Conn.
Watertown Mfg. Co., The, Watertown, Conn.
Western Plastics Moulding Co., Los Angeles, Calif.
Wheeling Stamping Co., Wheeling, W. Va.
White, S. S. Dental Mfg. Co., The, New York, N. Y.
Windman Bros., Los Angeles, Calif.
Wirz, A. H. Inc., Chester, Pa.
Wolford Plastic Molding Co., Los Angeles, Calif.
Worcester Moulded Plastics Co., Worcester, Mass.
Wright Plastics, Inc., New York, N. Y.
Yardley Plastics Co., Columbus, Ohio
Zenith Plastics, Inc., Cleveland, Ohio

PACKAGE DESIGN CONSULTANTS

(Independent Organizations)

California

Cruze, Charles, Los Angeles
Ullman, Martin, Los Angeles
Wheeler, Leon A., Los Angeles

Connecticut

Cheron, Pierre I., Stratford
Hall, Frances Cushing, Westport
Post & Johnson, Inc., Hartford

Georgia

Grau, Russell, Atlanta

Illinois

Bielefield, Inc., Herbert, Chicago
Carter, Joseph, Chicago
Chirpe, W. Rodney, Chicago
Farrel, Harry H., Chicago
Jones, E. Willis, Chicago
Knoche, Lucille, Chicago
Koch, Karl Peter, Chicago
Ressinger, Paul, Chicago
Spuehler, Ernst A., Chicago
Thelander, Clement J., Chicago

Massachusetts

Baermann, Walter, Holyoke
Marsh, George, Boston

Michigan

Cooper, R. G., Detroit
Swibold, Duane, Royal Oak

Missouri

Ditch, Ruth M., St. Louis
Gottschalk Design, University City.

New Jersey

Chipman, Richmond Lane Jr., Montclair

New York

Aids, Inc., New York City
Allen, Arthur S., New York City
Arens, Egmont, New York City
Bayer, Herbert, New York City
Bellisio, Bartolomeo, New York City
Bernhard, Lucian, New York City
Berni, Alan, New York City
Blumenthal, Margaret, New York City
Breen, Frederick Murray Inc., New York City
Clarke, Rene, New York City
Collura, Francesco, New York City
Colwell, Laurence J., New York City
Condon, Frank, New York City
D'Addario, Thomas, New York City
Davison, George, New York City
De Nina, James Andrew, New York City
Deskey, Donald, New York City
Dohner & Lippincott, New York City
Frederico, Joseph B., Niagara Falls
Freeman, Edna Leslie, New York City
Freeman, Nathaniel H., New York City
Gianninoto, Frank & Associates, New York City
Goldsborough, Francis F., New York City
Grover, Frederic S., Rochester
Haverlee, Arnold H., New York City
Hodges, Guy W. Inc., New York City
Hornung, Clarence P., New York City
Jay, Norbert, New York City
Karasz, Ilonka, Brewster
Ketcham, Howard, New York City
Koodin Lapow Associates, New York City
Koster, Louis, H., New York City
Lewis, Ben, New York City
Martiall & Scull, New York City
Maurer, Sascha A., New York City
Mayer, Fred A., New York City
Murray & Scheiding, New York City
Nash, Ben Inc., New York City
Nash, Jim, New York City
Nickelson, John, Flushing, L. I.
O'Neil, Wm., New York City
Paige, Richard E. Inc., New York City
Phenix Associates, New York City
Scheele, Edwin H., New York City
Schusterman, Wm. V., Bklyn City
Stengren, Jon, Forest Hills City
Tarpey, Thomas, Bronx
Von Miklos, Josephine, New York City
Weeks, Wentworth, New York City
Welder, W. Archibald, New York City
Wilmet, Georges, New York City
Woodbury, C. O., New York City

Ohio

Designers for Industry, Inc., Cleveland

Pennsylvania

Kline, Leon M., York

Wisconsin

Milwaukee Industrial Designers, Milwaukee

PRINTING ON GLASS, PLASTICS, etc.

Art Tube Co., Inc., Irvington, N. J.
Buckley, C. E. Co., Leominster, Mass.
Creative Printmakers Group, New York, N. Y.
Decorated Containers Co., Hillside, N. J.
Heidt Glass Works, Inc., Bklyn, N. Y.
Markem Machine Co., Keene, N. H.
Peerless Roll Leaf Co., Inc., Union City, N. J.
Printloid, Inc., New York, N. Y.
Sillocks-Miller Co., The, S. Orange, N. J.

SAMPLE & PACKAGE DISTRIBUTION

Whaling Distributing Corp., New York, N. Y.

TRANSPARENT MATERIALS, CONVERTERS OF RIGID CELLULOSIC SHEET

Acme Paper Box Co., Chicago, Ill.
Alderman Paper Box Corp., Rochester, N. Y.
Allvue Container Corp., Bklyn, N. Y.
Apex Paper Box Corp., Chicago, Ill.
Arrow Mfg. Co., Hoboken, N. J.
Athol Paper Box Co., Athol, Mass.
Atlanta Box Factory, Atlanta, Ga.
Atlantic Paper Box Co., Boston, Mass.
Autokraft Box Co., Hanover, Pa.
Babcock Box Co., Attleboro, Mass.
Barger Box Co., Inc., Elkhart, Ind.
Benton Harbor Mfg. Co., Benton Harbor Mich.
Bienfang Paper Co., New York, N. Y.
Bisler, G. A. Inc., Phila., Pa.
Box Novelties, Inc., New York, N. Y.
Box Shop, Inc., New Haven, Conn.
Bronzart Metals Co., New York, N. Y.
Buckley, C. E. Co., Leominster, Mass.
Buedingen, Wm. & Son, Rochester, N. Y.
Burt, F. N. Co., Inc., Buffalo, N. Y.
Cambridge Paper Box Co., Cambridge, Mass.
Casco Paper Box Co., Inc., Portland, Me.
Celanese Celluloid Corp., New York, N. Y.
Cellulose Packaging Corp., New York, N. Y.
Central States Paper & Bag Co., Inc., St. Louis, Mo.
Clark, Geo. V. Co., Inc., Long Island City, N. Y.
Cleveland Container Corp., Cleveland, Ohio
Clover Paper & Transparent Boxes, Inc., Long Island City, N. Y.
Cournand, E. L. Inc., New York, N. Y
Craftsman Label Co., New York, N. Y.
Crook Paper Box Co., Kansas City, Mo.
Dennison Mfg. Co., Framingham, Mass.
Design Center, Inc., New York, N. Y.
Dickerman Box Co., Cambridge, Mass.
Dorfman, A. & Co., Inc., New York, N. Y.
Earlville Paper Box Co., Earlville, N. Y.
Eggerss-O'Flyng Co., Omaha, Nebr.

Addresses of companies listed appear on pages 755–763

Embee Transparent Specialty Co., New York, N. Y.
Everett Transparent Container Co., New York, N. Y.
Fairchild, E. E. Corp., Rochester, N. Y.
Fleishhacker Paper Box Co., San Francisco, Calif.
Flower City Specialty Co., Rochester, N. Y.
Forbes Lithograph Mfg. Co., The, Boston, Mass.
Friend Box Co., Danvers, Mass.
Frost Box Co., Inc., Pawtucket, R. I.
Globe Paper Box Co., Chicago, Ill.
Great American Plastics Co., Leominster, Mass.
Harvard Specialty Mfg. Corp., Cambridge, Mass.
Henry, Ira L. Co., Watertown, Wis.
High Point Paper Box Co., High Point, N. C.
Hollywood Paper Box Div., The Flintkote Co., Hollywood, Calif.
Howell, F.M. & Co., Elmira, N. Y.
Hygienol Co., New York, N. Y.
Humitube Mfg. Co., Peoria, Ill.
J. L. Paper Box Co., Attleboro, Mass.
Kellogg, P. P. Co , Div. U. S. Envelope Co., Springfield, Mass.
Landowne, J. Co., The, Bklyn, N. Y.
Lebanon Paper Box Co., Lebanon Pa.
Leominster Paper Box Co., Leominster, Mass.
Lorscheider-Schang Co., Rochester, N. Y.
Mason Box Co., The, Attleboro Falls, Mass.
Meier, Joshua, New York, N. Y.
Menasha Products Co., The, Div. Marathon Paper Mills, Menasha, Wis.
Merrick Transparent Products, Long Island City, N. Y.
Meyer, Frank C. Co., Bklyn, N. Y.
Meyer, Jos. H. Bros., Bklyn, N. Y.
Miller, Walter P. Co., Inc., Phila., Pa.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
National Transparent Box Co., Springfield, Mass.
Neostyle, Inc., Chicago, Ill.
Nicoll & Co., San Francisco, Calif.
Old Dominion Box Co., Inc., Charlotte, N. C.
Paragon Plastics, Inc., Seattle, Wash.
Parfait Powder Puff Co., Chicago, Ill.
Paper Package Co., Indianapolis, Ind.
Pederson Mfg. Co., Los Angeles, Calif.
Pilliod Cabinet Co., The, Swanton, Ohio
Plumly, Geo. W. Co., Phila., Pa.
Price, M. B. Associates, New York, N. Y.
Printloid, Inc., New York, N. Y.
Reynolds Spring Co., Molded Plastics Div., Cambridge, Ohio
Ritchie, W. C. & Co., Chicago, Ill.
Robinson, A. E. & Co., Chicago, Ill.
Royal Paper Corp., New York, N. Y.
Schleicher, F. J. Paper Box Co., St. Louis, Mo.
Schulz, A. Geo. Co., Milwaukee, Wis.
Schunack, C. E. Inc., Meriden, Conn.
Seaman Box Co., Inc., New York, N. Y.
Shaw Paper Box Co., Meriden, Conn.
Shaw Paper Box Co., Pawtucket, R. I.
Shoup-Owens, Inc., Hoboken, N. J.
Siegel, A. L. Co., Inc., Newark, N. J.
Sillcocks-Miller Co., The, South Orange, N. J.
Stecker Paper Box Co., Detroit, Mich.
Stein, A. & Co., Inc., Chicago, Ill.
Sterling Injection Molding, Inc., Buffalo, N. Y.
Taylor Box Co., Providence, R. I.
Tower Envelope Co., New York, N. Y.
Transparent Specialties Corp., Cleveland, Ohio
Traver Corp., Chicago, Ill.
Union Specialty Co., Plainfield, N. J.
U. S. Envelope Co., Springfield, Mass.
U. S. Finishing & Mfg. Co., Chicago, Ill.
Walco Plastics, E. Orange, N. J.
Wallace Paper Box Corp., New York, N. Y.
Warneke Paper Box Co., Denver, Colo.
Warner Bros. Co., The, Bridgeport, Conn.
Waterbury Paper Box Co., Inc., Waterbury, Conn.
Weinman Bros., Chicago, Ill.
Williams Bros., St. Joseph, Mich.
Young, Douglas Inc., Pawtucket, R. I.
Young, Everett F. Co., Providence, R. I.
Zumbiel, C. W. Co., Cincinnati, Ohio

TRANSPARENT MATERIALS, CONVERTERS OF TRANSPARENT FILM

American Paper Goods Co., The, Kensington, Conn.
Andrews, P. L. Corp., Bklyn, N. Y.
Arvey Corp., Chicago, Ill., & Jersey City, N. J.
Bienfang Paper Co., New York, N. Y.
Cellulose Packaging Corp., New York, N. Y.
Central States Paper & Bag Co., St. Louis, Mo.
Comet Envelope & Paper Co., Inc., New York, N. Y.
Continental Bag Specialties Corp., New York, N. Y.
Crystal Transparent Corp., Inc., New York, N. Y.
Crystal Tube Corp., Chicago, Ill.
Cupples-Hesse Corp., St. Louis, Mo.
Daniels Mfg. Co., Rhinelander, Wis.
Dobeckmun Co., The, Cleveland, Ohio
Forbes Lithograph Mfg. Co., The, Boston, Mass.
Freydberg Bros.-Strauss, Inc., New York, N. Y.
General Felt Products, Inc., Bklyn, N. Y.
General Laminating, Inc., New York, N. Y.
Interstate Folding Box Co., Middletown, Ohio
Ivers-Lee Co., Newark, N. J.
Lebanon Paper Box Co., Lebanon, Pa.
Marvellum Co., The, Holyoke, Mass.
Mason Envelope Co., New York, N. Y.
Matthias Paper Corp., Phila., Pa.
Menasha Products Co., The, Div. of Marathon Paper Mills Co., Menasha, Wis.
Milprint, Inc., Milwaukee, Wis.
Mor-Gan Laminating & Foliating Co., New York, N. Y.
Munson Bag Co., The, Cleveland, Ohio
Nashua Gummed & Coated Paper Co., Nashua, N. H.
National Transparent Box Co., Springfield, Mass.
Neostyle Inc., Chicago, Ill.
Nicoll & Co., San Francisco, Calif.
Oneida Paper Prods., Inc., New York, N. Y.
Paragon Plastics, Inc., Seattle, Wash.
Paramount Paper Products Co., Inc., Phila. Pa.
Pie-Pak Co., Inc., Hoboken, N. J.
Plastics Finishing Corp., Bklyn, N. Y.
Pollock Paper & Box Co., Dallas, Tex.
Print-A-Tube Co., Passaic, N. J.
Royal Paper Corp., New York, N. Y.
Royal, Thomas M. & Co., Phila., Pa.
Shellmar Products Co., Mt. Vernon, Ohio
Sillcocks-Miller Co., The, S. Orange, N. J.
Swan Metal Cap Co., Chicago, Ill.
Tower Envelope Co., New York, N. Y.
Transparent Specialties Corp., Cleveland, Ohio
Traver Corp., Chicago, Ill.
Twitchell, E. W. Inc., Pkg. Div., Phila., Pa.
U. S. Envelope Co., Springfield, Mass.
Universal Jewelry Case Co., Chicopee, Mass.

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MODERN PACKAGING MAGAZINE

122 EAST 42nd STREET :: NEW YORK 17, NEW YORK CITY

•• ● DIRECTORY OF TRADE NAMES ● ••

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
A.C.M.	Box board, folding and display containers	American Coating Mills, Inc., Elkhart, Ind.
Ace	Steel strapping tightener	Stanley Works, New Britain, Conn.
Acetate Face	Bag with acetate film front and glassine back	Mason Envelope Co., New York, N. Y.
Ace-Tra	One-piece capsule metal tray	Ace Carton Corp., Cicero, Ill.
Acme	Stapling machinery and wire staples	Acme Staple Co., Camden, N. J.
Acme	Liquid fillers	U. S. Bottlers Machinery Co., Chicago, Ill.
Acme Steel Strapper	One-piece strap applying equipment	Acme Steel Co., Chicago, Ill.
Adament	Printing ink	Sigmund Ullman Co., Div. General Printing Ink Corp., Bronx, N. Y.
Addoweight	Automatic indicating, totalizing and counting scale	Merrick Scale Mfg. Co., Passaic, N. J.
Adhere	Decalcomania trade marking for cosmetic jars and bottles	Palm Bros. Decalcomania Co., The, Cincinnati, O.
Aeromatic	Automatic scales	Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Agate Dipping	For chocolate coating	Matthias Paper Corp., Phila., Pa.
Aico	Composition, cold molded	American Insulator Corp., New Freedom, Pa.
Air-Flo	Bottle cleaning and filling machine	Karl Kiefer Machine Co., Cincinnati, O.
Air Insulated	Featherweight molded containers	Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.
Air Line	Jar cleaning machine	Karl Kiefer Machine Co., Cincinnati, O.
Air-O-Seal	Cellophane covered coffee bag	Thomas M. Royal & Co., Phila., Pa.
Ajax Glaze	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Alcoa	Aluminum products	Aluminum Company of America, Pittsburgh, Pa.
Aldex	Filter paper	Aldine Paper Co., New York, N. Y.
Allison	Bag closing machine	B. F. Gump Co., Chicago, Ill.
All-Purpose	Metal caps for home canning	Anchor Hocking Glass Corp., Lancaster, O.
Allure	Embossed mica paper	Hazen Paper Co., Holyoke, Mass.
All-Weather	Weatherproofed displays for outdoor use	Badger Merchandising Displays, Inc., Milwaukee, Wis.
All-Weather	Rain-repellent kraft sheet	Bagpak, Inc., New York, N. Y.
Alseco	Seals or closures for glass containers	Aluminum Seal Co., New Kensington, Pa.
Alter-Proof	Tear-off band tamperproof	Aluminum Seal Co., New Kensington, Pa.
Aluminite	Metallic-coated papers	Keller-Dorian Corp., New York, N. Y.
Aluminite Mezzotint	Metallic-coated paper printed	Keller-Dorian Corp., New York, N. Y.
Alvac	Vacuum tumbler closure	Aluminum Seal Co., New Kensington, Pa.
Amekine	Synthetic rubber dropper nipples	Pennsylvania Glass Products Co., Pittsburgh, Pa.
American Beauty	Box cover paper	C. R. Whiting Co., Inc., Hackensack, N. J.
American Prints	Fancy printed, patriotic	Louis Delonge & Co., New York, N. Y.
Amerine	Composition, cold molded	American Insulator Corp., New Freedom, Pa.
Ameroid	Casein	American Plastics Corp., New York, N. Y.
Amerseal	Lug caps	Anchor Hocking Glass Corp., Lancaster, O.
Amerseal	Pouring spout with screw cap closure	Continental Can Co., New York, N. Y.
Amkleer	Cellophane bags and envelopes	American Paper Goods Co., Kensington, Conn.
Ampaco	Paper mailing boxes	H. Fleisig, Inc., New York, N. Y.
Amphenol	General trade mark	American Phenolic Corp., Chicago, Ill.
Amprinko	Printing inks	American Printing Ink Co., Div. General Printing Ink Corp., Chicago, Ill.
Amsco	Packaging units, loaders, sealers and rotary sealers	Amsco Packaging Machinery Co., Long Island City, N. Y.
Amstar	Cork, metal and wood closures	American Star Cork Co., Inc., Bklyn. N. Y.
Amyloid	Coated starch sheeting	American Products Mfg. Co., New Orleans, La.
Anchor	Metal and molded closures, sealing machines	Anchor Hocking Glass Corp., Lancaster, O.
Anchor	Steel strapping	Signode Steel Strapping Co., Chicago, Ill.
Androck	Wire display fixtures, floor and counter types	Washburn Co., Rockford, Ill.
Angel Glo Satin	High lustre satin	Taffel Bros., Inc., New York, N. Y.
Angle-Loc	Folding box for baked goods	The Ohio Boxboard Co., Wadsworth, O.
Anliner	Rotary aniline press	Kidder Press Co., Inc., Dover, N. H.
Anlink	Aniline ink, dye or pigmented type	Rotogravure Div., General Printing Ink Corp., New York, N. Y.
Anlink Kleensolve	Solvent, cleaning, for knurled rollers	Rotogravure Div., General Printing Ink Corp., New York, N. Y.
Anlox	Inks for Aniline Presses	International Printing Ink, Div. Interchemical Corp., New York, N. Y.
Apex	Steel strapping	Signode Steel Strapping Co., Chicago, Ill.
Aqualeen	Transparent greaseproof papers	Newark Paraffine & Parchment Paper Co., Newark, N. J.
Aquapearl	Cast phenolic pearl shades	Catalin Corp., New York, N. Y.
Aqua-Seal	Moisture-resistant carton board	The Ohio Boxboard Co. Wadsworth, O.
Aquasol	Stripping gum	Stein, Hall Mfg. Co., Chicago, Ill.
Aquatex	Waterproof closure for multi-wall paper bags	Bemis Bro. Bag Co., St. Louis, Mo.
Aquatite	Resinous adhesive	National Adhesives, Div. National Starch Products, Inc., New York, N. Y.
Arabol	Adhesive	Arabol Mfg. Co., New York, N. Y.
Araflex	Adhesive	Arabol Mfg. Co., New York, N. Y.
Aratex	Adhesive	Arabol Mfg. Co., New York, N. Y.
Arenco	Automatic packaging machines	Arenco Machine Co., New York, N. Y.
Argent Silver Print	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Argette	Box paper	Kupfer Bros. Co., New York, N. Y.
Aristo	Confectionery bags	American Paper Goods Co., Kensington, Conn.
Aristocrat	Folding paper boxes	Edwin J. Schoettle Co., Phila., Pa.
Aristocrat	Wax-lined food tray	Sutherland Paper Co., Kalamazoo, Mich.
Aristokraft	Cellophane garment bags	Central States Paper & Bag Co., St. Louis, Mo.
Aristowax	Paraffin wax	Petroleum Specialties, Inc., New York, N. Y.
Arksafe	Crinkled kraft linings for bags, barrels, drums and boxes. Crinkled paper in rolls and sheets	Arkell Safety Bag Co., New York, N. Y.
Armalloy	Collapsible tube metal	New England Collapsible Tube Co., Chicago, Ill.
Arrowhead	Inks and Varnishes	Flint, Howard Ink Co., Detroit, Mich.
Artboxtone	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Artcote	Pyroxylin metallic coated papers	Artcote Papers, Inc., Irvington, N. J.
Art-Craft	Fancy embossed paper	Springfield Coated Paper Corp., Camden, N. J.
Artex	Leather substitute paper	Bradner Smith & Co., Chicago, Ill.
Art Finished Pastels	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Art Floral	Brightwood kid finish papers	Holyoke Card & Paper Co., Springfield, Mass.
Art Gingham	Brightwood kid finish papers	Holyoke Card & Paper Co., Springfield, Mass.
Artillery	Box cover	District of Columbia Paper Mills, Inc., Washington, D.C.
Artmold	Molded plastic caps	Armstrong Cork Co., Lancaster, Pa.
Art Pastels	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Art Pockets	Folders with eyelet and long fasteners	Henry Schmidt & Bro., Inc., Phila., Pa.
Asphaltite	Board impregnated with odorless asphaltum	National Container Corp., Long Island City, N. Y.
Athos	Cover paper	United Mfg. Co., Springfield, Mass.
Atlasol	Adhesives	Atlas Gum & Sizing Co., New York, N. Y.
Auger-Vac	Filling equipment	Stokes & Smith Co., Frankford, Phila., Pa.
Aulcoid	Quick-drying finish for metal and wood	Ault & Wiborg, Div. Interchemical Corp., New York, N. Y.
Aulflex	Flexible synthetic resin finish	Ault & Wiborg, Div., Interchemical Corp., New York, N. Y.
Aulspar	Water-resistant spar varnish	Ault & Wiborg, Div., Interchemical Corp., New York, N. Y.
Aultone	Pyroxylin lacquer for air-dried metal finishing	Ault & Wiborg, Div. Interchemical Corp., New York, N. Y.
Autoclench	Stapler	Bostitch, Inc., East Greenwich, R. I.
Autofoil	Roll leaf	Coughlin Mfg. Co., New York, N. Y.
Autokrat	Collapsible paper boxes	Edwin J. Schoettle Co., Phila., Pa.
Auto-Pac	Automatic folding glued cartons	Gordon-Lavin Paper Box Co., Inc., Baltimore, Md.

Addresses of companies listed appear on pages 755–763

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
B-M Wrap	Moistureproof wrapping	Plastic Coating Corp., Holyoke, Mass.
"B" Brand	Tin cans and closing machines	National Can Corp., New York, N. Y.
Babytone	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Bagpak	Multi-wall paper bag filling and closing equipment	Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Bagpakers	Bag filling and closing machinery	Bagpak, Inc., New York, N. Y.
Bakelite	Plastics and resins	Bakelite Corp., New York, N. Y.
Ballyhoo	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Bandbox Stripes	Printed papers, fancy	Louis Dejonge & Co., New York, N. Y.
Barkstone	Imitation cork box covers	District of Columbia Paper Mills, Inc., Washington, D.C.
Bar-Nun	Bag feeders, openers, weighers and closers	B. F. Gump Co., Chicago, Ill.
Bar-Nun Auto Check	Automatic net weighers	B. F. Gump Co., Chicago, Ill.
Barque	Print box paper	The Marvellum Co., Holyoke, Mass.
Bar-Kap	Bar use caps	Aluminum Seal Co., New Kensington, Pa.
Barroll Nozzle	Special nozzle with screw closure	Continental Can Co., New York, N. Y.
Bas Relief	Gold and silver topped embossed paper	Hampden Glazed Paper & Card Co., Holyoke, Mass.
Beacon	Inturned lug caps	Anchor Hocking Glass Corp., Lancaster, O.
Beau Tye	Cotton ribbon	Freydberg Bros.-Strauss, Inc., New York, N. Y.
Beauwood	Decorative paper	Hazen Paper Co., Holyoke, Mass.
Bedford Cord	Embossed mica paper	Hazen Paper Co., Holyoke, Mass.
Beetle	Urea-formaldehyde molding material	American Cyanamid Co., Plastics Div., New York, N. Y.
Bells and Stars	Fancy paper	Louis Dejonge & Co., New York, N. Y.
Bendall	Attachment for steel rule bender	J. F. Helmold & Bro., Inc., Chicago, Ill.
Ben Mont	Gift wrappings, tissues, glassine bags, shredded waxed papers	Ben Mont Papers, Inc., Bennington, Vt.
Bergmann	Ice cream fillers	Horix Mfg. Co., Pittsburgh, Pa.
Bethcolite	Tin plate	Bethlehem Steel Co., Bethlehem, Pa.
Betterbilt	Setup paper boxes	Thoma Paper Box, Inc., Buffalo, N. Y.
Better-Pac	Sealing tape machine	Better Pkgs., Inc., Shelton, Conn.
Big Chief	Glass bottles	Owens-Illinois Glass Co., Toledo, O.
Birch	Box cover	District of Columbia Paper Mills, Inc., Washington, D.C.
Birchette	Box paper	Kupfer Bros. Co., New York, N. Y.
Blackbird Embossed	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Blackol	Varnished paper liner	General Felt Products, Inc., Bklyn, N. Y.
Blacktone	Printing ink	Sigmund Ullman Co., Div. General Printing Ink Corp., Bronx, N. Y.
Blanchette	Box paper	Kupfer Bros. Co., New York, N. Y.
Bliss	Wire stitchers	Dexter Folder Co., New York, N. Y.
Bliss	Solid fibre shipping containers	Robert Gair Co., Inc., New York, N. Y.
Block Board	Heavy pressed board signs	Chaspec Mfg. Co., New York, N. Y.
Blossomtime	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Blue Bird	Paper labels	Wheeler-Van Label Co., Grand Rapids, Mich.
Blu-Kor	Gummed cloth tape	The Gummed Products Co., Troy, O.
Blum	Testing machines	The LaBoiteaux Co., Inc., Cincinnati, O.
Bond	Gross weighers and filling machines	U.S. Automatic Box Machinery Co., Inc., Roslindale, Boston, Mass.
Bondco	Corrugated box adhesive	Stein, Hall Mfg. Co., Chicago, Ill.
Bond-Crowns	Crowns for beverage bottles and cans	Bond Mfg. Corp., Inc., Wilmington, Del.
Boostars	Portable belt conveyors	The Rapids-Standard Co., Inc. Grand Rapids, Mich.
Bo-Seals	Pre-tied, cellulose bows	Stark Bros. Ribbon Corp., New York, N. Y.
Bostitch	Wire staples, staplers, stitchers, tackers	Bostitch, Inc., East Greenwich, R. I.
Boston	Wire stitchers	Dexter Folder Co., New York, N. Y.
Bouquet	Fancy paper	Louis Dejonge & Co., New York, N. Y.
Boxcrafters	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Bread-Tite	Specialty wrappers for bread and food	Dixie Wax Paper Co., Inc., Dallas, Texas
Brazilian Bright	Nature papers	Bradner Smith & Co., Chicago, Ill.
Brighten Leaf	Roll leaf	Griffin, Campbell, Hayes, Walsh, Inc., New York, N. Y.
Bright Spots	Fancy paper	Louis Dejonge & Co., New York, N. Y.
Brightwood	Box covering paper	Holyoke Card & Paper Co., Springfield, Mass.
Brightwood	Paper box making machine	U.S. Automatic Box Machinery Co., Inc., Roslindale, Boston Mass.
Brightwood Cameo	Box cover paper	Holyoke Card & Paper Co., Springfield, Mass.
Brightwood Polychrome	Box covering paper	Holyoke Card & Paper Co., Springfield, Mass.
Brightwood Saleens	Box covering paper	Holyoke Card & Paper Co., Springfield, Mass.
Brilliant Metallics	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Britecote	Paper stock	Brooks Bank Note Co., Springfield, Mass.
Broadside	Folding carton	Robert Gair Co., Inc., New York, N. Y.
Brocade	Printed embossed paper	Hampden Glazed Paper & Card Co., Holyoke, Mass.
Broken Back	Patented display container	Brooks Bank Note Co., Springfield, Mass.
Bronzart	Counter and window displays and point of sale material	Bronzert Metals Co., New York, N. Y.
Bronzoid	Embossed signs	Chaspec Mfg. Co., New York, N. Y.
Brooks Twin	Double unit display container	Brooks Bank Note Co., Springfield, Mass.
Brownie	Beer bottle (glass)	Brockway Glass Co., Inc., Brockway, Pa.
Brownskin	Waterproof wrapper	Angier Corp., Framingham, Mass.
Brownskin Vaporseal	Waterproof, vapor-resisting tape	Angier Corp., Framingham, Mass.
Bruno	Semi-automatic can filling machine	The Vol-U-Meter Co., Buffalo, N. Y.
Brunswick Homespuns	Paper for box coverings	Penobscot Paper Co., New York, N. Y.
Buckskin	Kraft lined boxes	Morris Paper Mills, Chicago, Ill.
Bulkan	For shipment up to 5 gal.	Sealright Co., Inc., Fulton, N. Y.
Bulkbinding	Steel strapping	Signode Steel Strapping Co., Chicago, Ill.
Bulk-Flo	Elevator-conveyor-feeder	Link Belt Co., Chicago, Ill.
Burlabox	Export water-resistant containers	National Container Corp., Long Island City, N. Y.
CT	Continuous thread screw caps	Phoenix Metal Cap Co., Chicago, Ill.
Camachines	Slitting and roll winding machines	Cameron Machine Co., Bklyn, N. Y.
Camel Brand	Corrugated containers	The Ashtabula Corrugated Box Co., Ashtabula, O.
Cameo-Cut	Cut out letters, ornament signatures	Cameo Die & Label Co., New York, N. Y.
Cameoflex	Iridescent label printing process	Cameo Die & Label Co., New York, N. Y.
Cameo-Shine	Substitute for aluminum foil	Cameo Die & Label Co., New York, N. Y.
Cameron	Can making machinery	Cameron Can Machinery Co., Chicago, Ill.
Camlet	Two-tone embossed paper	Springfield Coated Paper Corp., Camden, N. J.
Campac	Can and tube closure	Cambridge Paper Box Co., Cambridge, Mass.
Canco	Miscellaneous tin cans and containers	American Can Co., New York, N. Y.
Candy Stripes	Fancy paper	Louis Dejonge & Co., New York, N. Y.
Canno	Belt conveyor	Karl Kiefer Machine Co., Cincinnati, O.
Canvas	Embossed mica paper	Hazen Paper Co., Holyoke, Mass.
Capem	Automatic screw capping machines	Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Captive Cap	Collapsible tube	National Collapsible Tube Co., Providence, R. I.
Carbofilm	Coated wood gum sheeting	American Products Mfg. Co., New Orleans, La.
Carnival	Embossed foil box papers	Hazen Paper Co., Holyoke, Mass.
Carpac	Reinforced sealing tape	Atlantic Gummed Paper Corp., Bklyn, N. Y.
Carpenter	Fibre drums	Carpenter Container Co., Inc., Bklyn, N. Y.
Carry-Safe	Egg carton	Self-Locking Carton Co., Chicago, Ill.
Cereal	Closure	Owens-Illinois Glass Co., Toledo, O.
Catabond	Phenolic resin adhesive	Catalin Corp., New York, N. Y.
Catalin	Cast phenolic resin	Catalin Corp., New York, N. Y.
Catavar	Phenolic laminating resin	Catalin Corp., New York, N. Y.
Ceco	Carton folding, closing and glue sealing machines	Container Equipment Corp., Newark, N. J.
Cedar	Woodgrain box papers	Hazen Paper Co., Holyoke, Mass.
Celaire	Opaque, transparent, and translucent cellulose acetate in colors	E. L. Cournand, Inc., New York, N. Y.
Ceglin	Cellulose finishes for textiles	Sylvania Industrial Corp., New York, N. Y.
Cello	Cellophane ribbon	Freydberg Bros.-Strauss, Inc., New York, N. Y.
Cello-Face	Bag with cellophane front and glassine back	Mason Envelope Co., New York, N. Y.
Cellophane	Transparent cellulose sheeting	E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.
Cellophane	Transparent cellulose sheeting	Sylvania Industrial Corp., New York, N. Y.
Cello-Safe	Cellophane lollypop sticks	Fibre Cord Co., New York, N. Y.
Cellosheen	Super-transparent glassine	Deerfield Glassine Co., Monroe Bridge, Mass.
Cell-U-Art	For packaging men's underwear, lingerie, candy, etc.	Traver Corp., Chicago, Ill.

Addresses of companies listed appear on pages 755–763

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Cellucolor	Wrappers	Shellmar Products Co., Mt. Vernon, O.
Cellu-Gums	Adhesives for gluing transparent sheeting	National Adhesives, Div. National Starch Products, Inc., New York, N. Y.
Cellulin	Wrappers	Shellmar Products Co., Mt. Vernon, O.
Celluloid	Cellulose nitrate base; sheets, rods, tubes, rolls	Celanese Celluloid Corp., New York, N. Y.
Celluplastic	Sheet-formed acetate vials and tubes	Celluplastic Corp., Newark, N. J.
Cell-U-Print	Varnished bags	Thomas M. Royal & Co., Phila., Pa.
Cellusuede	Flock paper	Stevens-Nelson Paper Corp., New York, N. Y.
Cellusuede	Velour paper	Cellusuede Products, Inc., Rockford, Ill.
Celolustre	Box coating	National Metal Edge Box Co., Phila., Pa.
Celonite	Cellulose nitrate plastic sheeting	Monsanto Chemical Co., Plastics Div., Springfield, Mass.
Celons	Secondary bottle closures	Celon Co., Madison, Wis.
Cel-O-Seal	Cellulose caps and bands	Armstrong Cork Co., Lancaster, Pa.
Cel-O-Seal	Cellulose Band	E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.
Celoshine	Waxed glassine bags with window	Dixie Wax Paper Co., Inc., Dallas, Texas
Celowax	Waxed sulphite	Riegel Paper Corp., New York, N. Y.
Cel-Spar	Box covering papers	Paper City Mfg. Co., Inc., Holyoke, Mass.
Cam	Filling and capping machines	Crown Cork & Seal Co., Baltimore, Md.
Camac	Milk bottle capping machine	Crown Cork & Seal Co., Baltimore, Md.
Camco	Beer filling and capping machines	Crown Cork & Seal Co., Baltimore, Md.
Century	Carton gluer	E. G. Staude Mfg. Co., St. Paul, Minn.
Challenger	Cellulose window gluing machine	E. G. Staude Mfg. Co., St. Paul, Minn.
Challis Print	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Chanbon	Typographic printing presses	Champlain Div., The Fred Goat Co., New York, N. Y.
Chameleon	Leatherette paper	Springfield Coated Paper Corp., Camden, N. J.
Champion	Envelope mfg. machine	F. L. Smith Machine Co., Inc., New York, N. Y.
Champion	Adjustable shell making machine	E. G. Staude Mfg. Co., St. Paul, Minn.
Champlain	Roll fed rotogravure printing equipment	Champlain Div., The Fred Goat Co., New York, N. Y.
Chastik	Adhesive backing	Chaspec Mfg. Co., Inc., New York, N. Y.
Chatoye	Pyroxylin treated box papers	Plastic Coating Corp., Holyoke, Mass.
Check-Weigher	Automatic check-weighing scale	Merrick Scale Mfg. Co., Passaic, N. J.
Cheerio	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Chemco Lac	Quick drying varnish	Chemical Color & Supply Co., Div. General Printing Ink Corp., Chicago, Ill.
Chemco Lightning Set	Ink compound	Chemical Color & Supply Co., Div. General Printing Ink Corp., Chicago, Ill.
Chemco Wax	Ink compound	Chemical Color & Supply Co., Div. General Printing Ink Corp., Chicago, Ill.
Chest Craft	Anti-tarnish silverware chests	Leominster Paper Box Co., Leominster, Mass.
Cheviot	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Cheviot	Paper box covering	Pejepscot Paper Co., New York, N. Y.
Chevron Print	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Chick Pullman	Corrugated chick shipping containers	Inland Container Corp., Indianapolis, Ind.
Chilton	Metal inlaying in plastics	Plastic Inlays, Inc., Summit, N. J.
Christmas Candle	Fancy paper	Louis Dejonge & Co., New York, N. Y.
Christmas Ribbons	Fancy printed paper	Louis Dejonge & Co., New York, N. Y.
Cinati	Liquid bottling machine	Karl Kiefer Machine Co., Cincinnati, O.
Cinati Junior	Liquid bottling machine	Karl Kiefer Machine Co., Cincinnati, O.
Cin-Made	Fibre cans	The Cin-Made Corp., Cincinnati, O.
Circle "A"	Molded and metal caps, corks and glass containers	Armstrong Cork Co., Lancaster, Pa.
Citrustrap	Steel strapping	Acme Steel Co., Chicago, Ill.
Clarbond	Corrugated case sealing glue	Clark Stek-O Corp., Rochester, N. Y.
Clargum	Bottle labeling glue	Clark Stek-O Corp., Rochester, N. Y.
Clarophane	Window bags	Oneida Paper Products, Inc., New York, N. Y., also Continental Bag Specialties Corp., New York, N. Y.
Clarpic	Pick-up glue for labeling cans	Clark Stek-O Corp., Rochester, N. Y.
Clarseal	Liquid glue for sealing cases	Clark Stek-O Corp., Rochester, N. Y.
Clartac	Carton sealing glue	Clark Stek-O Corp., Rochester, N. Y.
Clartab	Ready mixed adhesive for general purposes	Clark Stek-O Corp., Rochester, N. Y.
Clearit	Asbestos	Scientific Filter Co., New York, N. Y.
Clearseal	Heat sealing glassine	Hartford City Paper Co., Hartford City, Ind.

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Clearseal	Thermoplastic coated acetate	General Laminating, Inc., New York, N. Y.
Clearsite	Cellulose acetate containers and products	Celluplastic Corp., Newark, N. J.
Clearview	Cellophane bags	Equitable Paper Bag Co., Inc., Long Island City, N. Y.
Cleveco	Lined fibre can	Cleveland Container Co., Cleveland, O.
Click-Top	Hinged cover box	National Folding Box Co., New Haven, Conn.
Climax	Bottle wrappers	The Hinde & Dauch Paper Co., Sandusky, O.
Clipper	Cellophane bag making machine	Modern Containers, Inc., Los Angeles, Calif.
Clipper Made	Cellophane bags	Modern Containers, Inc., Los Angeles, Calif.
Cloud	Paper box covering	Pejepscot Paper Co., New York, N. Y.
Coach and Four	Fancy paper	Louis Dejonge & Co., New York, N. Y.
Coated Lithwite	Coated box board	The Gardner-Richardson Co., Middletown, O.
Code-O-Matic	For code or control number printing	New Jersey Machine Corp., Hoboken, N. J.
Collwrap	Wrapper for wire, hose, etc.	Angier Corp., Framingham, Mass.
Collofilm	Adhesive	Stein, Hall Mfg. Co., Chicago, Ill.
Colodense	Wrappers	Shellmar Products Co., Mt. Vernon, O.
Colorama	Pyroxylin coated metallic papers in brilliant colors	Hazen Paper Co., Holyoke, Mass.
Colorettes	Printed cellophane flower pot wrappers	The Dobeckmun Co., Cleveland, O.
Colorfilm	Cellulose laminated coated paper	The Dobeckmun Co., Cleveland, O.
Colorgraphic	Transparent signs and calendars	The U. S. Printing & Litho Co., Cincinnati (Norwood), O.
Coloroid	Applied finishes to bottles and jars	Coloroid Co., Inc., Cleveland O.
Coloroid	Custom finishes (lacquer)	Double Duty Products, Inc., Cleveland, O.
Color-Pak	Colored shipping containers and floor displays	The U. S. Corrugated-Fiber Box Co., Indianapolis, Ind.
Colorstitch	Colored stapling and stitching wire	Acme Steel Co., Chicago, Ill.
Col-O-Tex	Artificial leather	Columbus Coated Fabrics Corp., Columbus, O.
Colr-Typ	Cotton tips	Fibre Cord Co., New York, N. Y.
Colt Air	Insulated containers	Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.
Coltjems	Semi-precious stones (plastics)	Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.
Coltrock	Phenolic	Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.
Coltwood	High impact phenolic	Colt's Patent Fire Arms Mfg. Co , Hartford, Conn.
Columbia	Hand numbering machines	Wm. A. Force, & Co., Inc. Bklyn, N. Y.
Columbus	Overweight - underweight scales	The Exact Weight Scale Co., Columbus, O.
Comet	Sealing tapes	McLaurin-Jones Co., Brookfield, Mass.
Comet	Box stays	E. G. Staude Mfg. Co., St. Paul, Minn.
Commando	Out-folding carton gluer	Louis Dejonge & Co., New York, N. Y.
Common Sense	Protective paper	Owens-Illinois Glass Co., Toledo, O.
Complete Satintone	Jars and bottles	Chas. W. Williams & Co., Inc., New York, N. Y.
Complimentary Print	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Concora	Boxboard cartons and containers	Container Corp. of America, Chicago, Ill.
Congo	Casein metallic box papers	Hazen Paper Co., Holyoke, Mass.
Conomee	Box cover paper	Matthias Paper Corp., Phila., Pa.
Consolidated	Textile bag closers	Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Container Slotter	Corrugated container slotter and creaser	E. G. Staude Mfg. Co., St. Paul, Minn.
Conti-Chrome	Screenless color reproductions	Continental Lithograph Corp., Cleveland, O.
Conti-Glo	Fluorescent lithographed displays lacquers and coatings	Continental Lithograph Corp., Cleveland, O.
Conti-Glo Line	Ultraviolet assemblies	Continental Lithograph Corp. Cleveland, O.
Continental Gloss	Coated color embossed	Keller-Dorian Corp., New York, N. Y.
Continental Metalac	Coated color embossed, printed	Keller-Dorian Corp., New York, N. Y.
Cord-Sheen	Embossed mica paper	Hazen Paper Co., Holyoke, Mass.
Corduretle	Imitation cloth paper	C. R. Whiting Co., Inc., Hackensack, N. J.
Corkruta	Imitation cork paper	C. R. Whiting Co., Inc., Hackensack, N. J.
Corktec	Imitation cork	Paper Affiliates Co., Inc., New York, N. Y.
Cork-Tex	Cork products (discs, sheets, rods, slabs etc.)	Bond Mfg. Corp., Inc., Wilmington, Del.
Corley-Miller	Wrapping and sheeting machines	Miller Wrapping & Sealing Machine Co., Chicago, Ill.
Corning Brand	Glass rod, tubing and tumblers	Corning Glass Works, Corning, N. Y.
Corrodek	Corrugated cushioning	Sherman Paper Products Corp., Newton Upper Falls, Mass.
Corroflex	Flexible corrugated	Sherman Paper Prdoucts Corp., Newton Upper Falls, Mass.
Corro-Fibre	Printing inks	J. M. Huber, Inc., New York, N. Y.

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Corrucrepe	All directional stretch papers	Cincinnati Industries, Inc., Cincinnati (Lockland), O.
Corruflex	Display packages	Waldorf Paper Products Co., St. Paul, Minn.
Corrulined	Waterproof, paper-lined-fabric bags	Cincinnati Industries, Inc., Cincinnati (Lockland), O.
Corseal	Roll-on tamperproof over cork closure	Aluminum Seal Co., New Kensington, Pa.
Cotacord	Decorative tying cord—plastic covered	Freidberg Bros.-Strauss, Inc. New York, N. Y.
Cottonluxe	Anti-tarnish cotton-lined paper	Cottonluxe Mfg. Co., New York, N. Y.
Cottrel-Heinrich	Multi-color aniline printing press	H. H. Heinrich, Inc., New York, N. Y.
Counterboy	Sealing tape machines	Better Packages, Inc., Shelton, Conn.
Counter Clerk	Counter merchandising displays	Badger Merchandising Display, Inc., Milwaukee, Wis.
Coverite	Milk bottle closure	Sealright Co., Inc., Fulton, N.Y.
Cradle	Nursing bottles	Owens-Illinois Glass Co., Toledo, O.
Crescent	Transparent waxed paper	Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Cresco	Printing inks	Crescent Ink & Color Co. of Pa., Phila., Pa.
Crestone	Aniline ink	Crescent Ink & Color Co. of Pa., Phila., Pa.
Crest-Sheen	Embossed mica paper	Hazen Paper Co., Holyoke, Mass.
Creton-Sheen	Embossed mica paper	Hazen Paper Co., Holyoke, Mass.
Crstoone	Fancy printed papers	The Marvellum Co., Holyoke, Mass.
Crinkle-Tie	Ribbons	Chicago Printed String Co., Chicago, Ill.
Cripseal	Closure	Owens-Illinois Glass Co., Toledo, O.
Cross-Stitch	Embossed mica paper	Hazen-Paper Co., Holyoke, Mass.
Crown	Pottery	The Robinson Clay Products Co., New York, N. Y.
Cry-O-Vac	Protective wrap for frozen foodstuffs	Dewey & Almy Chemical Co., Cambridge, Mass.
Cryptic	Printing inks	Crescent Ink & Color Co. of Pa., Phila., Pa.
Crystal	Asbestos	Scientific Filter Co., New York, N. Y.
Crystal	Coated box coverings	McLaurin-Jones Co., Brookfield, Mass.
Crystal Box	Rigid display container having transparent ends and front	Forbes Litho. Mfg. Co., The, Boston, Mass.
Crystallon	Mother-of-pearl box paper and cardboard	Riegel Paper Corp., New York, N. Y.
Crystal-Pak	Rigid cellulose containers	Transparent Specialties Mfg. Co., Cleveland, O.
Crystalustre	Paper lacquer	Mass & Waldstein Co., Newark, N. J.
Crystiphane	Transparent, thermoplastic paper	Newark Paraffine & Parchment Paper Co., Newark, N. J.
Cumberland	Box covering and printing papers	S. D. Warren Co., Boston, Mass.
Cupiette	Box paper	Kupfer Bros. Co., New York, N. Y.
Cup-Paks	Paper drinking cups	Dixie-Vortex Co., Easton, Pa.
Curley Q	Covered wire	Taffel Bros., Inc., New York, N. Y
Cushion Stitch	Siftproof and moistureproof bag closure	Bagpak, Inc., New York, N. Y.
DL Krimpac	Semi-automatic packaging machine	Pack-Rite Machine Corp., Milwaukee, Wis.
D-O-K	Waxed kraft paper	Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Dacro	Metal milk bottle caps, coverall	Crown Cork & Seal Co., Baltimore, Md.
Damask	Embossed paper	Hampden Glazed Paper & Card Co., Holyoke, Mass.
Danagh	Counter displays	Robertson Paper Box Co., Inc., Montville, Conn.
Dan-D-Pak	Printed transparent wraps	Daniels Mfg. Co., Rhinelander, Wis.
Darex	Thermoplastic coating, sealing compounds and adhesives	Dewey & Almy Chemical Co., Cambridge, Mass.
D'Artagnan	Cover paper	United Mfg. Co., Springfield, Mass.
Davco	Silica gel	Davison Chemical Corp., Baltimore, Md.
Daystte	Box paper	Kupfer Bros. Co., New York, N. Y.
Deco Baskets	Paper tills	Waldorf Paper Products Co., St. Paul, Minn.
Deco Board	Decorated board	Waldorf Paper Products Co., St. Paul, Minn.
Deco Boxes	Decorated boxes	Waldorf Paper Products Co., St. Paul, Minn.
Decopad	Padding paper	Geo. H. Sweetnam, Inc., Cambridge, Mass.
Decoufle	Soda straw and toothpick wrapping machines	Arenco Machine Co., Inc., New York, N. Y.
Deerflex	Supercalendered sulphite	Deerfield Glassine Co., Monroe Bridge, Mass.
Defender	Steel strapping	Signode Steel Strapping Co., Chicago, Ill.
Defoamer	Felt cleaners (for paper mfrs.)	Atlas Gum & Sizing Co., New York, N. Y.
Deko-Art	Colored and embossed foil	Reynolds Metals Co., Richmond, Va.
Deltaseal	Bag with pouring spout	Bemis Bro. Bag Co., St. Louis, Mo.
Dependon	Box stays	McLaurin-Jones Co., Brookfield, Mass.
Design Craft	Display sets—corrugated	Sherman Paper Products Corp., Newton Upper Falls, Mass.

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Detecto	Scales	Detecto Scales, Inc., Bklyn, N.Y.
Detecto-Gram	Scales	Detecto Scales, Inc., Bklyn N.Y.
Detecto-Matic	Scales	Detecto Scales, Inc., Bklyn, N.Y.
Dewalco	Adhesives	Dewey & Almy Chemical Co., Cambridge, Mass.
Dewset	Instantaneous vapor setting inks	Frederick H. Levey Co., Inc., New York, N. Y.
Diacell	Filter	Karl Kiefer Machine Co., Cincinnati, O.
Diafane	Lacquered glassine	Riegel Paper Corp., New York, N. Y.
Diagonals	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Diamond	Thermoplastic tubing	The Visking Corp., Chicago, Ill.
Diastretch	Fluted paper used in waterproof, paper-lined fabrics	Fulton Bag & Cotton Mills, Atlanta, Ga.
Dignity Cheviot	Paper for box coverings	Pejepscot Paper Co., New York, N. Y.
Disco	Imitation fabrics and wood grains	District of Columbia Paper Mills, Inc., Washington, D. C.
Diskup	Hot drink cup	Sealright Co., Inc., Fulton, N. Y.
Dispersite	Natural and synthetic resins or elastomers dispersed in water or other medium	Dispersions Process, Inc., New York, N. Y.
Display-O	Window bags	Thomas M. Royal & Co., Phila., Pa.
Displayologist	Designers	Everett F. Young Co., Providence, R. I.
Dixie	Carton blanking machine	E. G. Staude Mfg. Co., St. Paul, Minn.
Dixie Cups	Paper drinking cups and containers	Dixie-Vortex Co., Easton, Pa.
Dolite	Cartons and boxes	The Dobeckmun Co., Cleveland, O.
Domino Sheen	Embossed mica paper	Hazen Paper Co., Holyoke, Mass.
Domore	Automatic processing machines	Wood, Nathan & Virkus Co., Inc., Racine, Wis.
Doplex	Cellulose acetate laminated to plain or printed paper laminated cartons	The Dobeckmun Co., Cleveland, O.
Doplex Brilliant	Waterproof paper	The Dobeckmun Co., Cleveland, O.
Dotted Swiss	Box papers	Hazen Paper Co., Holyoke, Mass.
Doubledge	Cellophane wrapper with double thick ends	The Dobeckmun Co., Cleveland, O.
Double Duty	Wire-handle paper pail (locktop)	Sutherland Paper Co., Kalamazoo, Mich.
Double Plate	Filter	Karl Kiefer Machine Co., Cincinnati, O.
Doublestone	Printing inks	Sigmund Ullman Co., Div. General Printing Ink Corp., Bronx, N. Y.
Doughboy	Bag and pouch sealer	Pack-Rite Machines, Milwaukee, Wis.
Dowicides	Germicides—fungicides	The Dow Chemical Co., Midland, Mich.
Drawlene	Enamels with special lubricants	Ault & Wiborg, Div. of Interchemical Corp., New York, N. Y.
Dri Ink	Opaque and transparent marking and stenciling colors	Floquil Products, Inc., New York, N. Y.
Dripcut	Syrup dispensers	Na-Mac Products Corp., Los Angeles, Calif.
Dri-Tape	Heat-sealing tape	Seal, Inc., Shelton, Conn.
Drumpak	Corrugated drums	Gaylord Container Corp., St. Louis, Mo.
Dry-Hesive	Pressure sensitive tapes	Gummed Tape & Devices Co., Bklyn, N. Y.
Dubl-Cushion	Egg carton	Bloomer Bros. Co., Newark, Wayne Co., N. Y.
Dubl-Vu	Cartons, window	Rossotti Lithographing Co., Inc., No. Bergen, N. J.
Dukutone	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Dullcoat	Suede mat coated papers	The Marvellum Co., Holyoke, Mass.
Dullset	Inks	Geo. H. Morrill Co., Div. General Printing Ink Corp., New York, N. Y.
Dulseal	Gummed matted acetate sheeting	General Laminating, Inc., New York, N. Y.
Dundee Fabrics	Box cover paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Dundee Plaid	Embossed mica paper	Hazen Paper Co., Holyoke, Mass.
Dunnflex	Gelatine glues	Thomas W. Dunn Co., New York, N. Y.
Duo-Bio	Bottle and jar cleaning machine	Karl Kiefer Machine Co., Cincinnati, O.
Duo-Piston	Filling machine for viscous materials	Karl Kiefer Machine Co., Cincinnati, O.
Duo-Seal	Custom lamination	C. B. Henschel Mfg. Co., Milwaukee, Wis.
Duo-Sheen	Embossed mica paper	Hazen Paper Co., Holyoke, Mass.
Duplex	Labeling machines and accessories	Liquid Carbonic Corp., Chicago, Ill.
Duplex	Lug cap	National Seal Corp., Bklyn, N.Y.
Duplex	Shipping-display boxes	The Hinde & Dauch Paper Co., Sandusky, O.
Durafilm	Moisture-vaporproof cellulose film	The Dobeckmun Co., Cleveland, O.
Duraglas	Glass bottles, jars, containers	Owens-Illinois Glass Co., Toledo, O.; also Owens-Illinois Pacific Coast Co., San Francisco, Calif.
Duranite	Metal finishes	Atlas Powder Co., Zapon Div., Stamford, Conn., & N. Chicago, Ill.

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TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Duanol	Transparent boxes	Joseph H. Meyer Bros., New York, N. Y.
Durapak	Advertising displays Insoluble paper for wet crate lining	Paterson Parchment Paper Co., Bristol, Pa.
Duratite	Tin printing ink	Crescent Ink & Color Co. of Pa., Phila., Pa.
Durawhite	Boxboard	Paper Package Co., Indianapolis, Ind.
Durez	Phenolic molding compounds and resins	Durez Plastics and Chemicals, Inc., N. Tonawanda, N. Y.
Durite	Phenol-furfural, phenol-formaldehyde heat-setting molding compositions	Durite Plastics, Phila., Pa.
Durmas	Boxes and boxboards	Sample-Durick Co., Inc., Indian Orchard, Mass.
Durmeskote	Coating, for boxboard	Sample-Durick Co., Inc., Indian Orchard, Mass.
Dust-Proof	Dispensing spouts	Plastic Engineering, Inc., Cleveland, O.
Du-Tone	Triple edge cellophane ribbons Chenille and tinsel pointed gift wraps	Du-Tone Ribbon Corp., New York, N. Y.
Dux Bak	Waxed kraft	Central Waxed Paper Co., Chicago, Ill.
Dux-Pak	Carriers for cans and bottles	Brown & Bailey Co., Phila., Pa.
EZ	Hand operated air cleaner	U. S. Bottlers Machinery Co., Chicago, Ill.
E-Z-Pac	Transparent bags	U. S. Envelope Co., Springfield, Mass.
E-Z Sealer	Jaw type bag krimper	Pack-Rite Machine Corp., Milwaukee, Wis.
E. Z. Tearstrip	Paraffined containers	MonoServiceCo.,Newark,N.J.
Eagloss	Gloss printing inks	Eagle Printing Ink Co., Div. General Printing Ink Co. New York, N. Y.
Early American	Fancy printed Christmas papers	Louis Dejonge & Co., New York, N. Y.
Easterlone	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Easy Lift	Combination paper bag closure and handle	Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Econo-Cards	Display cards	Waldorf Paper Products Co., St. Paul, Minn.
Economy	Mailing bags	Bemis Bro. Bag Co., St. Louis, Mo.
Economy	Fibre drums	Carpenter Container Co., Inc., Bklyn, N. Y.
Economy	Semi-automatic carton sealer and weigher	Triangle Package Machinery Co., Chicago, Ill.
Economy Mailer	Mailing box	The Mason Box Co., Attleboro Falls, Mass.
Economy Spraylco	Liquid spray to prevent ink drying on press	Chemical Color & Supply Co., Div. General Printing Ink Corp., Chicago, Ill.
Econopac	Specialty wraps	Milprint Inc., Milwaukee, Wis.
Edbooser-Duplex	Automatic net weigher machines	B. F. Gump Co., Chicago, Ill.
Egyptian	Finishes for paper	The Egyptian Lacquer Mfg. Co., New York, N. Y.
Elasti-Cal	Decalcomania for the rubber industry	The Meyercord Co., Chicago, Ill.
Elastikraft	Single stretch papers	Cincinnati Industries, Inc., Cincinnati (Lockland), O.
Electrifugal	Liquid pumps	Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Elec-Tri-Pak	Automatic weighers	Triangle Package Machinery Co., Chicago, Ill.
Electro Tempered	Bottles	Owens-Illinois Glass Co., Toledo, O.
Ellisco	Cans	George D. Ellis & Sons, Inc., Phila., Pa.
Elmendorf	Tearing tester	Thwing-Albert Instrument Co., Phila., Pa.
Embrilla	Embossed coated papers	The Marvellum Co., Holyoke, Mass.
Empeco	Housefurnishing ware	National Can Corp., New York, N. Y.
Enduro	Stainless steel for packaging equipment	Republic Steel Corp., Cleveland, O.
Enamelette	Pyroxylin papers	C. R. Whiting Co., Inc., Hackensack, N. J.
Endweld	Tube filling and sealing machine	Karl Kiefer Machine Co., Cincinnati, O.
Engineered Precision	All Gardner-Richardson products	Gardner-Richardson Co., Middletown, O.
Engradel	Transparent decalcomania label	Palm, Fechteler & Co., New York, N. Y.
Enyew	Printing ink	Sigmund Ullman Co., Div. General Printing Ink Corp., Bronx, N. Y.
Ethocel	Transparent and rigid sheeting	The Dow Chemical Co., Midland, Mich.
Eureka	Rule press	J. F. Helmold & Bro., Inc., Chicago, Ill.
Evanstik	Bendall attachment Tipping in paste	The Commercial Paste Co., Columbus, O.
Everyday	Packaged inks	International Prtg. Ink Div. of Interchemical Corp., New York, N. Y.
Every Use	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Exact Weight	Check-weighing scales	Exact Weight Scale Co., Columbus, O.
Excelite	Thermo-setting plastic materials	Designers for Industry, Inc., Cleveland, O.
Excell-O	Cellophane ribbon	Freydberg Bros.-Strauss, Inc., New York, N. Y.
Executive	Lacquered wood grains, plain and embossed box-covers	District of Columbia Paper Mills, Inc., Washington, D. C.
Executive Velour	Suede finish	District of Columbia Paper Mills, Inc., Washington, D. C.

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Ex-L-Ite	Tin plate	Republic Steel Corp., Cleveland, O.
Exportex	Water-resistant V-Box, case liner, bag glues	Paisley Products, Inc., Chicago, Ill.
Express	Package sealers, gummed tape	Better Packages, Inc., Shelton, Conn
Express Glue	Liquid labeling paste	National Adhesives, Div. National Starch Products, New York, N. Y.
Eye-Petized	Illustrations of prepared food on labels and folding cartons	The United States Printing & Lithograph Co., Cincinnati (Norwood), O.
FNA	Flexible non-warp glue	Paisley Products, Inc., Chicago, Ill.
Fabkote	Pyroxylin coated fibre	E. I. du Pont de Nemours & Co., Inc., Arlington, N. J.
Fabrikoid	Pyroxylin coated fabric	E. I. du Pont de Nemours & Co., Inc., Arlington, N. J.
Fabrelle	Box paper	Kupfer Bros. Co., New York, N. Y.
Falco	Inks	Fuchs & Lang Mfg. Co., Div. General Printing Ink Corp., New York, N. Y.
Faltex	Inks	Fuchs & Lang Mfg. Co., Div. General Printing Ink Corp., New York, N. Y.
Fanfare	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Fast to Light	Flint glazed papers	Wyomissing Glazed Paper Co., Reading, Pa.
Fernwood	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Fibercote	Leatherette	Sherman Paper Products Corp., Newton Upper Falls, Mass.
Fiberpak	Fibre shipping drums	The Container Co., Van Wert, O.
Fibestos	Cellulose acetate plastics	Monsanto Chemical Co., Plastics Div., Springfield, Mass.
Fibo-Bilt	Die-cut display material	Badger Merchandising Displays Inc., Milwaukee, Wis.
Fibo-Board	Special heavy mounting board	Badger Merchandising Displays Inc., Milwaukee, Wis.
Fibre Lite	Card stock	Waldorf Paper Products Co., St. Paul, Minn.
Fibreen	Waterproof reinforced paper	Sisalkraft Co., The, Chicago, Ill.
Fiesta Flowers	Fancy printed papers	Louis Dejonge & Co., New York, N. Y.
Fill-Freeze	Cartons	Container Corp. of America, Chicago, Ill.
Filma-Seal	Closures	Ferdinand Gutmann & Co., Bklyn, N. Y.
Finco	Glue	Findley, F. G. Co., The, Milwaukee, Wis.
Fine Linen	Fancy printed	Louis Dejonge & Co., New York, N. Y.
Fine-Sheen	Embossed mica paper	Hazen Paper Co., Holyoke, Mass.
Fitchco	Board lining and paper	Fitchburg Paper Co., Fitchburg, Mass.
Flash Dri	Instantaneous heat setting ink	Fred'k H. Levey Co., Inc., New York, N. Y.
Flash Foils	Fancy paper	Louis Dejonge & Co., New York, N. Y.
Flash-Pac	Automatic glued folding trays	Gordon-Lavin Paper Box Co., Inc., Baltimore, Md.
Flat-Tin-Can	Foil lined envelope	Berkowitz Envelope Co., Kansas City, Mo.
Flat-Top	Conveyor chain	Link-Belt Co., Chicago, Ill.
Flav-O-Fresh	Coffee bags, also waxed sandwich bags	Oneida Paper Products, Inc., New York, N. Y., also Continental Bag Specialties Corp., New York, N. Y.
Flav-O-Tainer	Heat sealed container	Thomas M. Royal & Co., Phila. Pa.
Fleetfold	Moistureproof-greaseproof tray	Sutherland Paper Co., Kalamazoo, Mich.
Fleurette	Box paper	Kupfer Bros. Co., New York, N. Y.
Flexi-Cap	Atomizer spray and dropper closures	Double Duty Products, Inc., Cleveland, O.
Flexi-Cartons	Paper bags	Bemis Bro. Bag Co., St. Louis, Mo.
Flexiflat	Layflat paste	Paisley Products, Inc., Chicago, Ill.
Flexlined	Waterproof, paper-lined fabric bags	Cincinnati Industries, Inc., Cincinnati, (Lockland) O.
Flexo-Flint	Laminating paper for folding box board	Matthias Paper Corp., Phila., Pa.
Flexo Paste	Non-wrinkling liquid paste	National Adhesives, Div. National Starch Products, Inc. New York, N. Y.
Flexotic	Folding box with 3 dimensional panels	National Folding Box Co., New Haven, Conn.
Flexpak	Flexible wrapping paper	Hinde & Dauch Paper Co., Sandusky, O.
Flintex	Inks and varnishes	Flint, Howard Ink Co., Detroit, Mich.
Flintlok	Two-piece folding glued corner style	Hollywood Paper Box Div., The Flintkote Co., Hollywood, Calif.
Flintspray	Anti-offset spray solution	Flint Howard Ink Co., Detroit, Mich.
Flipseal "H"	Metal snap-on type cap for non-vacuum glass containers	The Aridor Co., Chicago, Ill.
Flipseal	"V" metal snap-on type cap for vacuum glass containers	The Aridor Co., Chicago, Ill.
Florabox	Lace box papers	Hazen Paper Co., Holyoke, Mass.
Flor-A-Fresh	Cellophane bags for flowers	Oneida Paper Products, Inc., New York, N. Y. also Continental Bag Specialties Corp., New York, N. Y.

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TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Floralettes	Cellophane mats	Shellmar Products Co., Mt. Vernon, O.
Flouise	Padding paper	George H. Sweetnam, Inc., Cambridge, Mass.
Flowers and Frills	Fancy paper	Louis Dejonge & Co., New York, N. Y.
Flowers and Ribbon	Fancy paper	Louis Dejonge & Co., New York, N. Y.
Follette	Box paper	Kupfer Bros. Co., New York, N. Y.
Foil Sea Shell Swirl	Box covering paper	Chas. W. Williams & Co., Inc. New York, N. Y.
Folio Tint	Adhesives and acetate (special)	Mor-Gan Laminating & Foilating Co., New York, N. Y.
Foilsman	Foil papers	C. R. Whiting Co., Inc., Hackenseck, N. J.
Foldex	Folding box liquid adhesive	Stein, Hall, Mfg. Co., Chicago, Ill.
Foldomatic	Collapsible cartons	Interstate Folding Box Co., Middletown, O.
Fold-Pak	Shipping cartons	Container Corp. of America, Chicago, Ill.
Foldtite	Mailing box	The C. J. Fox Co., Providence, R. I.
Food Pak	Plain cellophane bags	Food Packaging, Div. of Milprint, Inc., Milwaukee, Wis.
Food-Paks	Drinking containers	Dixie-Vortex Co., Easton, Pa.
Force	Hand numbering machines	Wm. A. Force & Co., Inc., Bklyn, N. Y.
For-Ply	Plywood shipping drum	Seymour & Peck Co., Chicago, Ill.
Foxocals	Decalcomania transfers	The Foxon Co., Providence, R. I.
Foxon	Labels, tags, seals	The Foxon Co., Providence, R. I.
Frame-Vue	Paper cartons, double end and side walls	The C. W. Zumbiel Co., Cincinnati (Norwood), O.
Fra-Pac	Ice cream package	Bloomer Bros. Co., Newark, Wayne Co., New York State
Freeztex	Frozen food locker packages	The Menasha Products Co., Div. of Marathon Paper Mills Co., Menasha, Wis.
Fresheen	Waxed bags	Dixie Wax Paper Co., Inc., Dallas, Texas
Frigid Board	Cold storage stock	Waldorf Paper Prdoucts Co., St. Paul, Minn.
Frostel	Pyroxylin metallic papers for labels, box coverings, covers, etc.	Plastic Coating Corp., Holyoke, Mass.
Frostex	Frozen foods bags and paper	Newark Paraffine & Parchment Paper Co., Newark, N. J.
Frost-Sheen	Embossed mica paper	Hazen Paper Co., Holyoke, Mass.
Full-Flow	Metal liquid shipping container	Wheeling Corrugating Co., Wheeling, W. Va.
Full Measure	Stock printed cellophane bags	The Dobeckmun Co., Cleveland, O.
Full View	Box window top	W. H. Deisroth Co., Inc., Phila., Pa.
Ful-Lok	Cellophane satchel bottom bags	Oneida Paper Products, Inc., New York, N. Y., also Continental Bag Specialties Corp., New York, N. Y.
Fusedge	Ribbon made of cut sealed acetate fabric	Freydberg Bros.-Strauss, Inc., New York, N. Y.
Gala	Casein	George Morrell Corp., Muskegon Heights, Mich.
Galom	Casein plastic	George Morrell Corp., Muskegon Heights, Mich.
Gator Hide	Kraft paper	George & Sherrard Paper Co., New York, N. Y.
Gaylord	Fibre boxes and folding cartons	Gaylord Container Corp., St. Louis, Mo.
Gem	Light-duty round nested paper containers	Lily-Tulip Cup Corp., New York, N. Y.
Gemcote	Plastic finishing	Gemloid Corp., Elmhurst, L. I., N. Y.
Gemlike	Jewell effect, sheet form	Gemloid Corp., Elmhurst, L. I., N. Y.
Gemlite	Injection molding	Gemloid Corp., Elmhurst, L. I., N. Y.
Gemloid and Enameloid Cloisonné	Plastic sheets with cloisonné designs	Gemloid Corp., Elmhurst, L. I., N. Y.
General	Box gluing machine	E. G. Staude Mfg. Co., St. Paul, Minn.
Georgian Silver	Printing ink	Sigmund Ullman Co., Div. General Printing Ink Corp., Bronx, N. Y.
Giant-Curve	Corrugated display material	Sherman Paper Products Corp., Newton Upper Falls, Mass.
Gift Shop	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Glazed Chintz	Printed flint paper	Hampden Glazed Paper and Card Co., Holyoke, Mass.
Globular	Parchment padding paper	George H. Sweetnam, Inc., Cambridge, Mass.
Glo-Ray	Gloss inks	International Prtg. Ink Div. of Interchemical Corp., New York, N. Y.
Glorette	Box paper	Kupfer Bros. Co., New York, N. Y.
Gloss Colorcote	Color gloss surface for packaging	Brooks Bank Note Co., Springfield, Mass.
Glosscote	Boxboard	Brooks Bank Note Co., Springfield, Mass.
Glossiroll	Corrugated paper display material	Excelsior Paper Specialties Co., New York, N. Y.
Glostone	Box covering paper	Paper City Mfg. Co., Inc., Holyoke, Mass.
Gloswite	Patent coated boxboard	Brooks Bank Note Co., Springfield, Mass.
Glow-Cote	Transparent top sizing for labels and wraps	Cambridge Paper Box Co., Cambridge, Mass.

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Glue-Fast	Glues	Glue Fast Equipment Co., Inc. New York, N. Y.
Glu-Pa-Co	Vegetable glue	The F. G. Findley Co., Milwaukee, Wis.
Glu-Weld	Waterproof adhesive	The F. G. Findley Co., Milwaukee, Wis.
		Union Paste Co., Hyde Park, Mass.
Glu-X-Tender	Blender for animal and flexible glues	The F. G. Findley Co., Milwaukee, Wis.
Goldentone	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Gold-Medal	Solid fibre beer carriers	Gaylord Container Corp., St. Louis, Mo.
Gold Seal	Cap compound, tin paste cover compound, drum compound	Dewey & Almy Chemical Co., Cambridge, Mass.
Goldseal	Colored specialty tapes	Gummed Tape & Devices Co., Bklyn, N. Y.
Goldy	Bottle closure	Aluminum Seal Co., New Kensington, Pa.
Golvaneer	Printing inks	Sigmund Ullman Co., Div. General Printing Ink Corp., Bronx, N. Y.
Go Safe	Mailing boxes	Everett F. Young Co., Providence, R.I.
Gravity	Roller conveyors and spiral chutes	Standard Conveyor Co., N. St. Paul, Minn.
Gravity Gram	Predetermined weight scale	Toledo Scale Co., Toledo, O.
Greywire	Display racks	The Gray Wire Specialty Co., Cleveland, O.
Greaseae	Grease resistant boxboard	Gardner-Richardson Co., Middletown, O.
Greasetite	Bakery package board	Waldorf Paper Products Co., St. Paul, Minn.
Green Core	Gummed cloth tapes	Mid-States Gummed Paper Co., Chicago, Ill.
Greystone	Clasp envelopes	American Paper Goods Co., Kensington, Conn.
Grip-Tight	Label paste for tin, metals	Paisley Products, Inc., Chicago, Ill. & New York, N. Y.
Grip-Tite	Tape, gummed	Chicago Gum Tape Co., Chicago, Ill.
Grizzlybear	Waterproof crinkled wrapper	Angier Corp., Framingham, Mass.
Guardian	Tamperproof aluminum bottle closures	Guardian Safety Seal Co., Chicago, Ill.
Guardsman	Cover paper	United Mfg. Co., Springfield, Mass.
Gumcraft	Gummed tapes	Gummed Tape & Devices Co., Bklyn, N. Y.
Gumcraft Liflat	Flat label paper	Gummed Tape & Devices Co., Bklyn, N. Y.
H & D	Corrugated shipping boxes	The Hinde & Dauch Paper Co., Sandusky, O.
HFN	Gelatinous, semi-iceproof bottle labeling gum	National Adhesives, Div., National Starch Products, Inc., New York, N. Y.
Hailer	Filling machines	Horix Mfg. Co., Pittsburgh, Pa.
Halyard	Wire opener metal cap	Anchor Hocking Glass Corp., Lancaster, O.
Hammerclear	Carton sealing paper	Anchor Hocking Glass Corp., Lancaster, O.
Hammerglass	Glassine paper	Anchor Hocking Glass Corp., Lancaster, O.
Hammerglint	Tarnish resistant paper	Anchor Hocking Glass Corp., Lancaster, O.
Hammer-Parchment	Greaseproof paper	Anchor Hocking Glass Corp., Lancaster, O.
Hampak	Printed transparent wraps	Daniels Mfg. Co., Rhinelander, Wis.
Handelok	Carry bag	Wolf Bros., Phila., Pa.
Handilift	Tiering machine	Standard Conveyor Co., N., St. Paul, Minn.
Handitol	Mending tapes	Gummed Tape & Devices Co., Bklyn, N. Y.
Handy Service	Package of sterilized glass bottles	Owens-Illinois Glass Co., Toledo, O.
Hang-Rite	Garment holders	Waldorf Paper Products Co., St. Paul, Minn.
Hardshell	Non-rubbing inks	Eagle Printing Ink Co., Div. General Printing Ink Corp., New York, N. Y.
Hard-Tex	Inks	Fuchs & Lang Mfg. Co., Div. General Printing Ink Corp., New York, N. Y.
Hartglass	Embossed sulphite	Hartford City Paper Co., Hartford City, Ind.
Helmco	Displays	Helmco, Inc., Chicago, Ill.
Hercules	Rule cutter	J. F. Helmold & Bro., Inc., Chicago, Ill.
Heresite	Synthetic resinous coating	Heresite & Chemical Co., Manitowoc, Wis.
Hermetican	Air tight tamperproof aluminum canister	Guardian Safety Seal Co., Chicago, Ill.
Hermeti-Pak	Folding carton	Frankenberg Bros., Inc., Columbus, O.
Hermeti-Seal	Heat-sealable innerlined carton	Frankenberg Bros., Inc., Columbus, O.
Hestico	Plastic tube clips	Heat Seal-It Co., Phila., Pa.
Hiawatha	Out-folding carton gluer	E. G. Staude Mfg. Co., St. Paul, Minn.
Hi-Gear	Automatic cartons	Fibreboard Products, Inc., San Francisco, Cal.
Higlo	Gloss printing inks	J. M. Huber, Inc., New York, N. Y.
Hi-Gloss	Varnishes and inks	Pope & Gray, Inc., New York, N. Y.
Hi-Gloss	Base paper for lacquer	S. D. Warren Co., Boston, Mass.
Hi-Low	Composite paper and shipping cartons	Container Corp. of America, Chicago, Ill.
Himes	One-piece box	American Box Board Co., Grand Rapids, Mich.

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TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Himes	Special automatic quick set folding boxes	Pollock Paper & Box Co., Dallas, Texas
Hi-Paco	Cartons for sheets, pillow cases, etc.	High Point Paper Box Co., Inc. High Point, N. C.
Hi-Pak	Cellophane bags for bulk groceries	Thomas M. Royal & Co., Phila., Pa.
Hoepner	Automatic scales, dry filling equipment, sewing machines, bag closures	Consolidated Packaging Machinery Corp., Buffalo, N. Y,
Holdfast	Black inks	International Printing Ink, Div. of Interchemical Corp., New York, N. Y.
Holdfast	Glues	The F. G. Findley Co., Milwaukee, Wis.
Holly Scroll	Fancy paper	Louis DeJonge & Co., New York, N. Y.
Hollykote	Special moisture and grease-proof treatment on paper board	Hollywood Paper Box, Div. The Flintkote Co., Hollywood, Calif.
Holm Scale	Filling machine	Miller Wrapping & Sealing Machine Co., Chicago, Ill.
Hooper	Corrugating, printing and container making machinery	F. X. Hooper Co., Inc., Glenarm, Md.
Hopewell Kraft	Kraft paper products	Hummel-Ross Fibre Corp., Hopewell, Va.
Hi-Scale	Synthetic pearl essence	Celanese - Celluloid Corp., New York, N. Y.
Hovbriks	Box papers	Hazen Paper Co., Holyoke, Mass.
Humi-Jar	Jar	Owens-Illinois Glass Co., Toledo, O.
Humitube	Bags, pouches, tubes and envelopes of cellophane	Humitube Mfg. Co., Peoria, Ill.
Hyalac	Window signs and decorations	The Meyercord Co., Chicago, Ill.
Hycoloid	Cellulose nitrate tubes and vials	Celluplastic Corp., Newark, N. J.
Hydratite	Water-resistant paste	National Adhesives, Div. National Starch Products, Inc., New York, N. Y.
Hydro-Tite	Asphalt center boxboard	Gardner-Richardson Co., Middletown, O.
Hydry	Moisture set inks	E. J. Kelly Co., Kalamazoo, Mich.
Hy-Glos	Gummed and ungummed labels	Tompkins' Label Service, Phila., Pa.
Hy-Lustre	Gloss inks	Robinson Tag & Label Co., New York, N. Y.
Hyroto	Rotogravure printing machine	Rotogravure Engineering Co., East Boston, Mass.
Hy-Speed	Bottling machinery	Alsop Engineering Corp., New York, N. Y.
IPI	Printing inks	International Printing Ink, Div. Interchemical Corp., New York, N. Y.
Ideal	Elevators, bucket type	B. F. Gump Co., Chicago, Ill.
Ideal	Wire stitching machine	Ideal Stitcher & Mfg. Co., Racine, Wis.
Ideal	Two-tube hand vacuum filler	U. S. Bottlers Machinery Co., Chicago, Ill.
Illustra-Color	Reproduction method for displays	The U. S. Printing & Lithograph Co., Cincinnati (Norwood), O.
Imperial Plastic Hardware	Handlers, knobs, pulls, etc.	Imperial Molded Products Corp., Chicago, Ill.
Impervite	Varnished paper liner	General Felt Products, Inc., Brooklyn, N. Y.
Impervo	Outdoor display	Arvey Corp., Chicago, Ill., & Jersey City, N. J.
Impervo	Label gum	National Adhesives, Div. National Starch Products, Inc., New York, N. Y.
Impression	Ink embossed coated paper	The Marvellum Co., Holyoke, Mass.
Incaloid	Transparent sheeting, adhesives, lacquers	American Products Mfg. Co., New Orleans, La.
Inco-Pads	Corrugated colored display material	Inland Container Corp., Indianapolis, Ind.
Inco-Rolls	Single face corrugated colored display	Inland Container Corp., Indianapolis, Ind.
Inco-Steps	Corrugated colored display material	Inland Container Corp., Indianapolis, Ind.
Indette	Box paper	Kupfer Bros. Co., New York, N. Y.
Indur	Phenolic molding compounds, resins and varnishes	Reilly Tar & Chemical Corp., Indianapolis, Ind.
Induwrap	Corrosion preventive wrapper	Angier Corp., Framingham, Mass.
Inerwov	Reinforced asphalt laminated sealing tape	Atlantic Gummed Paper Corp., Bklyn, N. Y.
Inercoat	Plain waterproof wrapping	Angier Corp., Framingham, Mass.
Inner-Lined	Prelined cartons	Interstate Folding Box Co., Middletown, O.
Inforstrung	Reinforced waterproof wrapping paper	Angier Corp., Framingham, Mass.
"Insite" Signs	Decalcomania transfers	Milprint, Inc., Milwaukee, Wis
Insulux	Glass block	Owens-Illinois Glass Co., Toledo, O.
Inswok	Custom laminated and molded plastic	The Richardson Co., Melrose Park, Chicago, Ill.
In-Tag	Gravure inks	In-Tag Div., Interchemical Corp., New York, N. Y.
International	Automatic box making machinery	International Paper Box Machine Co., Nashua, N. H.
Isascol	Stapling equipment	International Staple & Machine Co., Clifton Heights, Pa.
Ivaglass	Transparent waxed paper (self sealing)	Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Ivlix	Tape, gummed	Nashua Package Sealing Co., Inc., Nashua, N. H.
Ivanhoe	Paper boxes	Cambridge Paper Box Co. Cambridge, Mass.

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Ivorytone	Opaque coated paper	Newark Paraffine & Parchment Paper Co., Newark, N. J.
JW-Jr.	High-speed bottle washer	U. S. Bottlers Machinery Co., Chicago, Ill.
Jacquard	Embossed and tipped papers	The Marvellum Co., Holyoke, Mass.
Jalcoid	Tin plate	Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Jaypaco	Laminated board	Jaypaco Co., New York, N. Y.
Jaypaco	Laminated board	Joe Saiwen Paper Co., New York, N. Y.
Johnson	Machines, carton forming, lining, filling, folding, closing	Battle Creek Bread Wrapping Machine Co., Battle Creek, Mich.
Joniflex	Cloth pressure sensitive tape	Industrial Tape Corp., New Brunswick, N. J.
Judy	Rayon acetate fusedge ribbon	Freydberg Bros.-Strauss, Inc. New York, N. Y.
K.E.M.	Thermosetting molding compound	Makolot Corp., Boston, Mass.
KVP	Waxed papers plain and printed	Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Kake Hot	Pick up cement	The F. G. Findley Co., Milwaukee, Wis.
Kakimaco	Filter	Karl Kiefer Machine Co., Cincinnati, O.
Kala Cork	Cork paper	Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Kalafilm	Wrapping paper	Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Kan-D-Pak	Printed transparent wraps	Daniels Mfg. Co., Rhinelander, Wis.
Kaumark	Water-soluble marking ink	Kaumagraph Co., Wilmington, Del.
Kay-Dee-Pac	Paper pails	Container Corp. of America, Chicago, Ill.
Kayseel	Case sealing liquid adhesive	Stein, Hall Mfg. Co., Chicago, Ill.
Keglined	Beer and ale cans	American Can Co., New York, N. Y.
Kemgo	Printing compound	Markem Machine Co., Keene, N. H.
Kennacot	Pyroxylin coated papers	C. R. Whiting Co., Inc., Hackensack, N. J.
Kensington	Clasp envelopes	American Paper Goods Co., Kensington, Conn.
Keratol	Imitation leather	Atlas Powder Co., Zapon-Div., Stamford, Conn.
Keystone Stay	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Kidette	Box paper	Kupfer Bros. Co., New York, N. Y.
Kidskin	Pyroxylin box papers	Hazen Paper Co., Holyoke, Mass.
Kiltie Plaids	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Kimpak	Protective packing	Kimberly-Clark Corp., Neenah, Wis.
King Markwell	Marking and printing inks	Markem Machine Co,, Keene, N. H.
Kivar	Artificial leather	The Plastic Coating Corp., Holyoke, Mass.
Klean	Printing inks, lithographic supplies	International Printing Ink, Div. Interchemical Corp., New York, N. Y.
Klean Quick	Roller cleaner	International Printing Ink, Div. Interchemical Corp., New York, N. Y.
Kleen Kups	Paper hot drink containers	Mono Service Co., Newark, N. J.
Kleenway	Garbage and general utility bags	Oneida Paper Prods., Inc., New York, N. Y., also Continental Bag Specialties Corp., New York, N. Y.
Kleer Glaze	Transparent waxed paper	Central Waxed Paper Co., Chicago, Ill.
Kleerview	Glassine	Rhinelander Paper Co., Rhinelander, Wis.
Kleer View	Waxed glassine	Central Waxed Paper Co., Chicago, Ill.
Kleerwrap	Glassine	Rhinelander Paper Co., Rhinelander, Wis.
Kliktop	Latching hinged-cover box	National Folding Box Co., New Haven, Conn.
Klondike	Gold and silver casein papers	C. R. Whiting Co., Inc., Hackensack, N. J.
Klothwhite	Retail store wrapping paper	Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Knife-O	Closure	Owens-Illinois Glass Co., Toledo, O.
Kodaloid	Cellulose nitrate sheeting	Eastman Kodak Co., Rochester, N. Y.
Kodapak	Cellulose acetate sheeting	Eastman Kodak Co., Rochester, N.Y.
Kodatape	Gummed cloth tape	Eastman Kodak Co., Rochester, N. Y.
Koloprint	Automatic direct printing labeling machine (cans, bottles, etc.)	Designers for Industry, Inc., Cleveland, O.
Kork-N-Seal	Initial and re-sealing cap with lever	Continental Can Co., New York, N. Y.
Kork-N-Seal	Can cappers	Crown Cork & Seal Co., Baltimore, Md.
		Williams Sealing Corp., Decatur, Ill.
Koroseal	Soft form of Koroseal	B. F. Goodrich Co., Akron, O.
Koroloc	Solution of Koroseal	B. F. Goodrich Co., Akron, O.
Koroseal	Plasticized polyvinyl chloride	B. F. Goodrich Co., Akron, O.
Kraflex	Gummed kraft paper sealing tape	Central Paper Co., Menasha, Wis.
Krimpac	Specialty wraps	Milprint, Inc., Milwaukee, Wis.
Kromkote	Cast coated high finish paper	The Champion Paper & Fibre Co., Hamilton, O.

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TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
KwickKlasp	Mailing boxes	W. H. Deisroth Co., Inc., Phila., Pa.
Kwik-Klean	Filters (water)	The Liquid Carbonic Corp., Chicago, Ill.
Kwikset	Paper cartons	Container Corp. of America, Chicago, Ill.
Kwik-Way	Nameplates	Meyercord Co., Chicago, Ill.
Labco Fibre	Kraft board	The LaBoiteaux Co., Inc., Cincinnati, O.
LabeLid	Ointment boxes	Columbia Specialty Co., Inc., Baltimore, Md.
Labelrite	Fully automatic labeling equipment	New Jersey Machine Corp., Hoboken, N. J.
Labelstik	Metal ointment boxes	George D. Ellis & Sons, Inc., Phila., Pa.
Lace and Flowers	Fancy paper	Louis Dejonge & Co., New York, N. Y.
Lace Frills	Fancy paper	Louis Dejonge & Co., New York, N. Y.
Lacquefeather	Waterproof leather papers	C. R. Whiting Co., Inc., Hackensack, N. J.
Lac-R-Print	Lacquered bags	Thomas M. Royal & Co., Phila., Pa.
Lafayette	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Lamcote	Laminating of paper and all films	Arvey Corp., Chicago, Ill., & Jersey City, N. J.
Lamcote Cover	Cover stock	Arvey Corp., Chicago, Ill. & Jersey City, N. J.
Lamcote Fabrics	Cellulose laminated fabrics	Arvey Corp., Chicago, Ill. & Jersey City, N. J.
Laminam	Laminated paper, cloth, foil	General Laminating Co., New York, N. Y.
Laminizing	Combination of cellulose acetate sheets to paper	U. S. Finishing & Mfg. Co., Chicago, Ill.
Laminoid	Combining of cellulose acetate to paper and textiles	Laminoid, Inc., N. Bergen, N. J.
Lamiphane	Transparent high gloss vinyl finish for labels and wrappers	Stecher-Traung Litho. Corp., Rochester, N. Y.
Lam-Lac	High-gloss lacquer finish	F. N. Burt Co., Inc., Buffalo, N. Y.
Lamoflim	Simplex moistureproof bags or moistureproof liners	Benj. C. Betner Co., Devon, Pa.
Lard Pak	Printed transparent wraps	Daniels Mfg. Co., Rhinelander, Wis.
Latham	Wire stitchers	Dexter Folder Co., New York, N. Y.
Latlisette	Box paper	Kupfer Bros. Co., New York, N. Y.
Lavette	Box paper	Kupfer Bros. Co., New York, N. Y.
Leafage	Embossed mica paper	Hazen Paper Co., Holyoke, Mass.
Leatherette	Box paper	Kupfer Bros. Co., New York, N. Y.
Leatherette	Waterproof leather finished papers	The Marvellum Co., Holyoke, Mass.
Leather Foil	Marking foils for leather	Peerless Roll Leaf Co., Inc., Union City, N. J.
Leconet	Open-mesh bags	Bemis Bro. Bag Co., St. Louis, Mo.
Lenox Gold	Gold and platinum box coverings	McLaurin-Jones Co., Brookfield, Mass.
Lepaco	Moisture and greaseproof board	Lebanon Paper Box Co., Lebanon, Pa.
Lev-A-Lift	Permanently attached opening device for friction plug containers	The Lev-A-Lift Co., New York, N. Y.
Levelbest	Containers, shipping	Fibreboard Products, Inc., San Francisco, Calif.
Leverpak	Fibre shipping drums	The Container Co., Van Wert, O.
Liftab	Milk bottle caps	Sealright Co., Inc., Fulton, N. Y.
Liftright	Milk bottle caps	Sealright Co., Inc., Fulton, N. Y.
Lightning	Coated box coverings	McLaurin-Jones Co., Brookfield, Mass.
Lightning Seal	Bread wrappers	Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Likwid Proof	Ink	Chemical Color & Supply Co., Div. General Printing Ink Corp., Chicago, Ill.
Lily White	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Linco	Belt conveyor	Karl Kiefer Machine Co., Cincinnati, O.
Link-Belt	Elevating, conveying and power transmission equipment	Link-Belt Co., Chicago, Ill.
Lion	Adhesives	Manhatten Paste & Glue Co. Inc., Bklyn., N. Y.
Liquid	Labeling machines and accessories	The Liquid Carbonic Corp., Chicago, Ill.
Liquid Plating	A lamination substitute	Mor-Gan Laminating & Foliating, New York, N. Y.
Liquid Single	Labeling machines	The Liquid Carbonic Corp., Chicago, Ill.
Liquipak	Fibre shipping drums	The Container Co., Van Wert, O.
Liqui-Wash	Industrial workers' hand soap	Paisley Products, Inc., Chicago, Ill.
Listette	Box paper	Kupfer Bros. Co., New York, N. Y.
Lithochrome	Synthetic varnish to protect metal against corrosive agents	Ault & Wiborg, Div. Interchemical Corp., New York, N. Y.
Lithopaque	Printing process	The Dobeckmun Co., Cleveland, O.
Lithox	Lithographic inks	International Printing Ink, Div. Interchemical Corp., New York, N. Y.

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Lithwite	White uncoated boxboard	The Gardner-Richardson Co., Middletown, O.
Loabond	Styrene laminating	Catalin Corp., New York, N. Y.
Loalin	Polystyrene molding compound	Catalin Corp., New York, N. Y.
Loavar	Styrene surface coating	Catalin Corp., New York, N. Y.
Lock-Tite	Dress box	American Box Board Co., Grand Rapids, Mich.
Lock Top	Screw top can with locking lugs	Continental Can Co., New York, N. Y.
Locktop	Paper ice cream can	National Folding Box Co., New Haven, Conn.
Locktop	Paper cans	Morris Paper Mills, Chicago, Ill.
Loc-Rim	Fibre shipping drums	Carpenter Container Corp., Bklyn, N. Y.
Loftee Cotton	Filler for jewelry boxes	Union Wadding Co., Pawtucket, R. I.
Loksure	Meat wrapper	The Specialty Paper Co., Dayton, O.
Lookit	Set-up and acetate boxes	Flower City Specialty Co., Rochester, N. Y.
Loomlite	Textile box papers	Hazen Paper Co., Holyoke, Mass.
Lotol	Processed and compounded liquid latex	Naugatuck Chemical Div., U. S. Rubber Co., New York, N. Y.
Low Pressure	Bottle fillers	The Liquid Carbonic Corp., Chicago, Ill.
LoxTite	Partition for packaging candy, cookies, beverages, eggs, fragile commodities, etc.	Traver Corp., Chicago, Ill.
Lucite	Methyl methacrylate resin	E. I. du Pont de Nemours & Co., Inc., Arlington, N. J.
Lumarith	Cellulose acetate sheets, rods, tubes	Celanese Celluloid Corp., New York, N. Y.
Lumarith E.C.	Ethyl cellulose base molding materials	Celanese Celluloid Corp., New York, N. Y.
Lumarith V.N.	Vinyl acetate vinyl chloride copolymer base	Celanese Celluloid Corp., New York, N. Y.
Lustesael	Sulphite paper	Newark Paraffine & Parchment Paper Co., Newark, N. J.
Lusteroid	Transparent and colored vials and tubes	Lusteroid Container Co., Inc., South Orange, N. J.
Lustr-Cote	Gloss printing inks	Eagle Printing Ink Co., Div. General Printing Ink Co., New York, N. Y.
Lustrette	Box paper	Kupfer Bros. Co., New York, N. Y.
Lustre-Print	High gloss printed labels and seals	Dennison Mfg. Co., Framingham, Mass.
Lustro	Aniline printing process	Milprint, Inc., Milwaukee, Wis.
Lustro	Cellophane ribbon	Food Packaging, Inc., Milwaukee, Wis.
Lustrofoil	Marking foil	Peerless Roll Leaf Co., Inc, Union City, N. J.
Lustron	Polystyrene molding compound	Monsanto Chemical Co., Plastics Div., Springfield, Mass.
Lustron	Wrapping paper	Hartford City Paper Co., Hartford City, Ind.
Lustseal	Closure	Owens-Illinois Glass Co., Toledo, O.
Lux-Lite	Displays with flashers	Reynolds Metals Co., Richmond, Va.
Luxor Gold	Gold box covering	McLaurin-Jones Co., Brookfield, Mass.
Luxorline	Box cover paper	Matthias Paper Corp., Phila., Pa.
Lyonsdale	Tissue paper	Moyer & Pratt, Inc., Lyons Falls, N. Y.
"MRK" Resinoid	Caster and truck wheels	The Rapids-Standard Co., Inc., Grand Rapids, Mich.
Mailmaster	Mailing box	The Mason Box Co. ,Attleboro, Falls, Mass.
Mainstay	Bag closing twine	Bemis Bro. Bag Co., St. Louis, Mo.
Makalot	Phenol-formaldehyde molding compounds and resins	Makalot Corp., Boston, Mass.
Mallefold	Malleable crease display material	Waldorf Paper Products Co., St. Paul, Minn.
Manalux	Bags for hygroscopic products	The Menasha Products Co., Div. of Marathon Paper Mills Co., Menasha, Wis.
Manapak	Bags and liners for frozen food packages	The Menasha Products Co., Div. of Marathon Paper Mills Co., Menasha, Wis.
Marble-Sheen	Embossed mica paper	Hazen Paper Co., Holyoke, Mass.
Marco	Leather grain paper	The Marvellum Co., Holyoke, Mass.
Markem	Printing machines	Markem Machine Co., Keene, N. H.
Market Paper	Meat wrapping paper	Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Master	Infolding diagonal gluing machine	E. G. Staude Mfg. Co., St. Paul, Minn.
Master, The	Fibre shipping drums	The Master Package Corp., Owen, Wis.
Masterbuilt	Candy boxes	F. J. Schleicher Paper Box Co., St. Louis, Mo.
Mastercraft	All Ben Mont products	Ben Mont Papers, Inc., Bennington, Vt.
Mastercraft	Leatherette boxes and displays	Harlich Mfg. Co., Mastercraft Div., Chicago, Ill.
Master Prints	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Master Ray	Metal surfaced counter and window displays	Reynolds Metals Co., Richmond, Va.
Masterwrap	Interfolded waxed tissue	Rhinelander Paper Co., Rhinelander, Wis.
Matador	Paper bag machines	H. H. Heinrich, Inc., New York, N. Y.

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TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Match-Box	Kit for matching colors	International Printing Ink, Div. Interchemical Corp., New York, N. Y.
Mayflower	Paper drinking cups	American Paper Goods Co., Kensington, Conn.
Mazein	Soluble extract of the protein in corn	Corn Products Refining Co., New York, N. Y.
Measure Scoop	Bag filling device	Food Packaging, Div. of Milprint, Inc., Milwaukee, Wis.
Meico	Decorated metal containers	Seymour Products Co., Seymour, Conn.
Melmac	Melamine-formaldehyde molding material and adhesives	American Cyanamid Co., Plastics Div., New York, N. Y.
Melody Print	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Melurac	Melamine, urea adhesive	American Cyanamid Co., Plastics Div , New York, N. Y.
Menasha	Paraffined cartons and papers	The Menasha Products Co., Div. Marathon Paper Mills Co., Menasha, Wis.
Mercury	Closure	Owens-Illinois Glass Co., Toledo, O.
Mercury	Carton gluer	E. G. Staude Mfg. Co., St. Paul, Minn.
Mercury	Vignette for labels	The U. S. Printing & Lithograph Co., Cincinnati (Norwood), O.
Meshtex	Fluted paper cemented to cotton web, for wrapping and concrete curing mats	Fulton Bag & Cotton Mills, Atlanta, Ga.
Metacel	Metal adhesive tape	Reynolds Metals Co., Richmond, Va.
Metal-Art	Fancy paper	Louis Dejonge & Co., New York, N. Y.
Metal Art Plaid	Box covering paper	Holyoke Card & Paper Co., Springfield, Mass.
Metal Edge	Reinforced paper boxes	National Metal Edge Box Co., Phila., Pa.
Metaflex	Flexible hot glue	National Adhesives, Div. National Starch Products, Inc., New York, N. Y.
Metal Lac	Metal printed and embossed friction glazed papers and boards	Keller-Dorian Corp., New York, N. Y.
Metalglass	Metallic coated glassine	Hartford City Paper Co., Hartford City, Ind.
Metaline	Printed embossed paper	Hampden Glazed Paper & Card Co., Holyoke, Mass.
Metallic	Pyroxylin coated metallic papers	Hazen Paper Co., Holyoke, Mass.
Metaloid	Embossed signs and boxes and plaques	Chaspec Mfg. Co., Inc., New York, N. Y.
Metaloid	Pyroxylin coated paper	The Plastic Coating Corp., Holyoke, Mass.
Metalour	Gold and silver papers	The Marvellum Co., Holyoke, Mass.
Metal Seal	Foil and imitation foil	Bradner Smith & Co., Chicago, Ill.
Metaltite	Flat gummed paper	The Gummed Products Co., Troy, O.
Metaltone	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Metalustre	Metallic lacquer enamels	Maas & Waldstein Co., Newark, N. J.
Metex	Gold or silver cellulose acetate	E. L. Cournand, Inc., New York, N. Y.
Methocel	Dow methyl cellulose	The Dow Chemical Co., Midland, Mich.
Metlak	Silver and gold ink	Pope & Gray, Inc., New York, N. Y.
Metso	Cleansers	Philadelphia Quartz Co., Phila. Pa.
Mezzotint	Printed and embossed metallic coated papers and boards	Keller-Dorian Corp., New York, N. Y.
Mic	Molded plastics	Molded Insulation Co., Phila., Pa.
Micacrystal	Crinkled cellophane	Alding Paper Co., New York, N. Y.
Michcote	Super white boxboard	Michigan Carton Co., Battle Creek, Mich.
Midget	Static eliminator	The Simco Co., Phila., Pa.
Midget	Wire staples	Acme Staple Co., Camden, N. J.
Midget	Labeling machines and accessories	The Liquid Carbonic Corp., Chicago, Ill.
Mikah	Glues and pastes, gums, lacquers	National Adhesives Div., National Starch Products, Inc., New York, N. Y.
Millbridge	General	Springfield Coated Paper Corp., Camden, N. J.
Miller	Package and bundle wrapping machines	Miller Wrapping & Sealing Machine Co., Chicago, Ill.
Milliplastic	Extruded saran	Elmer E. Mills Corp., Chicago, Ill.
Mil-O-Seal	Pliofilm encasing cooked meat loaves	Milprint, Inc., Milwaukee, Wis.
Milwaukee	Anilline printing press and bronzing machines	C. B. Henschel Mfg. Co., Milwaukee, Wis.
Mistle	Box paper	Kupfer Bros. Co., New York, N. Y.
Mirofoil	Imitation foil papers	Marvellum Co., Holyoke, Mass.
Mirolite	Transparent thermoplastic papers	Newark Paraffine & Parchment Paper Co., Newark, N. J.
Mirodescent	Box papers	Hazen Paper Co., Holyoke, Mass.
Mirroflex	Flexible hot glue	National Adhesives, Div. National Starch Products, Inc., New York, N. Y.
Mirror Flints	Glazed flint	Louis Dejonge & Co., New York, N. Y.
Modern Clipper	Automatic bag-making machine	Modern Containers, Inc., Los Angeles, Calif.
Moderne Dull Antique	Clay coated paper	Bradner Smith & Co., Chicago, Ill.

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Modern Union	Metal displays	Union Steel Products Co., Albion, Mich.
Moistite	Bakery package board	Waldorf Paper Products Co., St. Paul, Minn.
Moist Prof	Set-up paper cigar boxes	Consolidated Box Co., Inc., Tampa, Fla.
Molloy-Made	Imitation leather containers	The S. K. Smith Co., Chicago, Ill.
Monarch	Fillers	The Liquid Carbonic Corp., Chicago, Ill.
Monarch	Right angle folding box gluer	E. G. Staude Mfg. Co., St. Paul, Minn.
Monocell	Filter	Karl Kiefer Machine Co., Cincinnati, O.
Mono Kleen Kups	Paraffined containers	Mono Service Co., Newark, N. J.
Mono-Pak	Collapsible tubes for single use	A. H. Wirz, Inc., Chester, Pa.
Mono-Piston	Filling machine for viscous materials	Karl Kiefer Machine Co., Cincinnati, O.
Monoscale	Can filling machine	Karl Kiefer Machine Co., Cincinnati, O.
Mono Spout	Spout fitting	Continental Can Co., New York, N. Y.
Morr Glos	Gloss ink	Geo. H. Morrill Co., Div. General Printing Ink Corp., New York, N. Y.
Morris	Box closing lock	Robertson Paper Box Co., Inc., Montville, Conn.
Morrison	Wire stitchers	Harris - Seybold - Potter Co., Dayton, O.
Mosaic Parquetry	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Moto-Air	Pump for vacuum and pressure	New Jersey Machine Corp., Hoboken, N. J.
Multi	Printing ink	Sigmund Ullman Co., Div. General Printing Ink Corp., Bronx, N. Y.
Multitite	Printing inks	Sigmund Ullman Co., Div. General Printing Ink Corp., Bronx, N. Y.
Multitone	Printing inks	Sigmund Ullman Co., Div. General Printing Ink Corp., Bronx, N. Y.
Multiwax	Petroleum wax	Petroleum Specialties, Inc., New York, N. Y.
Mural	Fancy waterproof box paper	The Marvellum Co., Holyoke, Mass.
Myers Labelstik	Seamless metal boxes	George D. Ellis & Sons, Inc., Myers Mfg. Div., Phila., Pa.
Myracol	Cartons	Container Corp. of America, Chicago, Ill.
Nafomatic	Folding paper box	National Folding Box Co., New Haven, Conn.
Nanking	Chinese papers	The Stevens-Nelson Paper Corp., New York, N. Y.
Napcones	Displays	The National Process Co., New York, N. Y.
Napconstruction	Unmounted displays	The National Process Co., New York, N. Y.
Nap grippe	Displays	The National Process Co., New York, N. Y.
Natco	Asphalt laminated paper	National Water-Proofing Co., Camden, N. J.
National	Labeling machines and accessories	The Liquid Carbonic Corp., Chicago, Ill.
National	Tape moistening machine	Nashua Package Sealing Co., Inc., Nashua, N. H.
National	Food products metal bags	Reynolds Metals Co., Richmond, Va.
National	Packaging machinery	U. S. Automatic Box Machinery Co., Inc., Roslindale, Boston, Mass.
Needlekraft	Paper for box coverings	Pejepscot Paper Co., New York, N. Y.
Neillite	Phenol-formaldehyde molding powder	The Watertown Mfg. Co., Watertown, Conn.
Neocell	Cellulose vials, containers and specialties	Celluplastic Corp., Newark, N. J.
Neo-Classic	Embossed mica paper	Hazen Paper Co., Holyoke, Mass.
Nestcup	Nesting container	Sutherland Paper Co., Kalamazoo, Mich.
Nestrite	Heavy-duty round nested paper container	Lily-Tulip Cup Corp., New York, N. Y.
Nestyle	Nested type container	Sealright Co., Inc., Fulton, N. Y.
Neutraglas	Chemically resistant glass	Kimble Glass Co., Vineland, N. J.
Neventop	Carton filling and sealing machine	Stokes & Smith Co., Phila., Pa.
Newman Seal	Circular compounded crimped closure	Continental Can Co., New York, N. Y.
New Perfection	Dropping outfits	Pennsylvania Glass Products Co., Pittsburgh, Pa.
Niagara Wire Stitcher	Wire stitching and stapling machine	Paslode Co., Chicago, Ill.
Nicro-Steel	Casters	The Rapids-Standard Co., Inc., Grand Rapids, Mich.
Nitron	Cellulose nitrate plastics	Monsanto Chemical Co., Plastics Div., Springfield, Mass.
Nixonite	Cellulose acetate (sheets, rods and tubes)	Nixon Nitration Works, Nixon, N. J.
Nixonite M.P.	Cellulose acetate molding powder	Nixon Nitration Works, Nixon, N. J.
Nixonoid	Cellulose nitrate (pyroxylin)	Nixon Nitration Works, Nixon, N. J.
Nojax	Cellulose meat casings	The Visking Corp., Chicago, Ill.
No-Kap	Closures	No-Kap Closures (U.S.A.), Inc., Providence, R. I.
No-Kap	Collapsible tubes	National Collapsible Tube Co., Providence, R. I.

Addresses of companies listed appear on pages 755–763

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Nolox	Knock-down paper box	American Box Board Co., Grand Rapids, Mich.
Nolox	Garment boxes	Morris Paper Mills, Chicago, Ill.
Nolox	Special automatic quick set folding boxes	Pollock Paper & Box Co., Dallas, Texas.
No-Lox	Folding carton	Robert Gair Co., Inc., New York, N. Y.
Non-Scuff	Liner board on corrugated boxes	F. J. Kress Box Co., Pittsburgh, Pa.
Non-Warp Glue	Flexible hot glue	National Adhesives, Div. National Starch Products, Inc., New York, N. Y.
Norbutus	Pyroxylin coated metallic papers in brilliant colors	Hazen Paper Co., Holyoke, Mass.
Norloc	Molded plastic packages	Norton Laboratories, Inc., Lockport, N. Y.
No Sol Vit	Alkali free serum containers	T. C. Wheaton Co., Millville, N. J.
Nover	Decalcomania label	Palm, Fechteler & Co., New York, N. Y.
Nub-Linen	Fancy printed	Louis Dejonge & Co., New York, N. Y.
Nu-Craft	Display, corrugated	Sherman Paper Products Corp., Newton Upper Falls, Mass.
Nu-Curve	Corrugated display material	Sherman Paper Products Corp., Newton Upper Falls, Mass.
Nugget	Cover paper	United Mfg. Co., Springfield, Mass.
Nu-Glas	Glass tumblers, jars and bottles	Anchor Hocking Glass Corp., Lancaster, O.
NuGlaze	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Nu-Hide	Box cover paper	Matthias Paper Corp., Phila., Pa.
NuMat	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Nu-Trim	Corrugated display material	Sherman Paper Products Corp., Newton Upper Falls, Mass.
Nuvoheck	Folding paper box	Everett F. Young Co., Providence R. I.
Nuvopak	Collapsible set-up boxes	Cambridge Paper Box Co. Cambridge, Mass.
O. & J.	Labeling machines and accessories	Liquid Carbonic Corp., Chicago, Ill.
Obsco	Folding paper box	National Folding Box Co., New Haven, Conn.
Oldelace	Fancy paper	Louis Dejonge & Co., New York, N. Y.
Old Tavern	Gold and platinum box coverings	McLaurin-Jones Co., Brookfield, Mass.
One-A-Time	Pill dispensing box	National Folding Box Co. New Haven, Conn.
Onized	Containers	Owens-Illinois Glass Co., Toledo, O.
Opalite	Cast phenolic semi-transparent	Catalin Corp., New York, N. Y.
Opalon	Cast phenolic plastics	Monsanto Chemical Co., Plastics Div., Springfield, Mass.
Orientone	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Orpco	Corrugated boxes and displays	Ottawa River Paper Co., Toledo, O.
Outserts	Package advertising for the outside of containers	Outserts, Inc., New York, N. Y.
Overseal	Bottle closure	Aluminum Seal Co., New Kensington, Pa.
Pacemaker	Gumming machine	New Jersey Machine Corp., Hoboken, N. J.
Packer	Sealing tape machine	Better Packages, Inc., Shelton, Conn.
Packette	Utility bags	Newark Paraffine & Parchment Paper Co., Newark, N. J.
Packomatic	Packaging machinery	J. L. Ferguson Co., Joliet, Ill.
Packomatic Chief	6-in-line net wt. scale	J. L. Ferguson Co., Joliet, Ill.
Packrette	Box paper	Kupfer Bros. Co., New York, N. Y.
Pack-Rite	Sealers	Pack-Rite Machines, Milwaukee, Wis.
Pac-Kups	Paper containers	Dixie-Cup Co., Easton, Pa.
Pacquette	Cellophane bag	Thomas M. Royal & Co., Phila., Pa.
Padinol	Flexible adhesive	The Fales Chemical Co., Inc., Cornwall Landing, N. Y.
Padocel	Padding paper	Geo. H. Sweetnam, Inc., Cambridge, Mass.
Padox	Box top padding	Union Wadding Co., Pawtucket, R. I.
Padsil	Padding paper	Geo. H. Sweetnam, Inc., Cambridge, Mass.
Pads-It	Cold process padding gum	The Commercial Paste Co., Columbus, O.
Pals-Flex	Flexible adhesives	Paisley Products, Inc., Chicago, Ill.
Paisley	General line	Paisley Products, Inc., Chicago, Ill.
Paisley Spray	Solution for non-offset spray guns	Paisley Products, Inc., Chicago, Ill.
Paistex	Latex base adhesives	Paisley Products, Inc., Chicago, Ill.
Paistick	Office, school, library paste	Paisley Products, Inc., Chicago, Ill.
Paker Bulkan	For bulk shipments, up to 30 lbs.	Sealright Co., Inc., Fulton, N. Y.
Pak King	Filling machine	Weigh Right Automatic Scale Co., Joliet, Ill.
Pak-Saks	Frozen food containers	Thomas M. Royal & Co., Phila., Pa.
Paktite	Light-duty pleated round nested paper container	Lily-Tulip Cup Corp., New York, N. Y.
Palmetto	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Palmlac	All purpose decalcomania for outdoor uses	The Palm Bros. Decalcomania Co., Cincinnati, O.
Pamlite	Silver polishing cloth	The Gorham Co., Providence, R. I.
Panaseal	Laminated paper liner	General Felt Products, Inc., Bklyn, N. Y.
Paperglos	Glassine paper	Westfield River Paper Co., Russell, Mass.
Papricloth	Treated parchment	Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Parafane	Super-transparent, glassine, lacquered paper	Paramount Paper Products Co., Inc., Phila., Pa.
Paragon	Two-piece caps	Anchor Hocking Glass Corp., Lancaster, O.
Paragon	Hand numbering machines	Wm. A. Force & Co., Inc., Bklyn., N. Y.
Parakote	Moistureproof coated packaging papers	Menasha Products Co., Div. Marathon Paper Mills Co., Menasha, Wis.
Paramount	General	Paramount Paper Products Co., Inc., Phila., Pa.
Paraply	Moistureproof and greaseproof laminated cartons	The Menasha Products Co., Div. of Marathon Paper Mills Co., Menasha, Wis.
Para-Shield	Thermoplastic coatings for bottle sealing	Paragon Plastics, Inc., Seattle, Wash.
Para-Ware	Plastic containers and tableware	Paragon Plastics, Inc., Seattle, Wash.
Parawax	Preprint waxed bags	Paramount Paper Products Co., Inc., Phila., Pa.
Parchkin	Vegetable parchment for art printing	Paterson Parchment Paper Co., Bristol, Pa.
Parchstone	Greaseproof innerwrap	Rhinelander Paper Co., Rhinelander, Wis.
Parkay	Woodgrain box papers	Hazen Paper Co., Holyoke, Mass.
Parkwood	Impregnated wood plastic material	Parkwood Corp., Wakefield, Mass.
Parquet	Wood grain (imitation) box covers	District of Columbia Paper Mills, Inc., Washington, D. C.
Parquette	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Parry	Paper box machinery	Samuel R. Parry Mach. Co., Inc., Rochester, N. Y.
Pastel Creations	Paper for box coverings	Pejepscot Paper Co., New York, N. Y.
Patapake	White paper for printing and packaging	Paterson Parchment Paper Co., Bristol, Pa.
Pataper	Grease-resisting and boilproof vegetable parchment	Paterson Parchment Paper Co., Bristol, Pa.
Patawite	A 9-lb. manifold	Paterson Parchment Paper Co., Bristol, Pa.
Paxwell	Padding	American Lace Paper Co., Milwaukee, Wis.
Peak-O-Net	Cotton bags	American National Bag & Burlap Co., Inc., Bklyn, N. Y.
Pee Gee	Reducing and non-scratch ink compounds	Pope & Gray, Inc., New York, N. Y.
Peel-Pail	Ice cream pail	Bloomer Bros., Co., Newark, New York State
Peerless	Stamping presses	Peerless Roll Leaf Co., Inc., Union City, N. J.
Peerless	Roll leaf	E. G. Staude Mfg. Co., St. Paul, Minn.
Peerless	Infolding gluing machine	U. S. Bottlers Machinery Co., Chicago, Ill.
Peerless	Straight line vacuum fillers	Kupfer Bros. Co., New York, N. Y.
Pellette	Box paper	Kupfer Bros. Co., New York, N. Y.
Penergette	Box paper	Thwing-Albert Instrument Co., Phila., Pa.
Penescope	Penetration tester	Champlain Div., The Fred Goat Co., New York, N. Y.
Perfect Circle Plates	Engravings	Royal Paper Corp., New York, N. Y.
Perfection	Box covering papers	The Tablet & Ticket Co., Chicago, Ill.
Perfect-O-Cut	Embossed labels and seals	Milprint, Inc., Milwaukee, Wis.
Perfecto Pac	Pie collar	Industrial Tape Corp., New Brunswick, N. J.
Permacel	Paper pressure sensitive tape	The F. G. Findley Co., Milwaukee, Wis.
Permaflex	Glue	National Adhesives, Div., National Starch Products, Inc., New York, N. Y.
Perma-Stic	Label gum	Hazen Paper Co., Holyoke, Mass.
Petite Moire	Embossed mica paper	Hazen Paper Co., Holyoke, Mass.
Phantom	Embossed box papers	Reynolds Metals Co., Richmond, Va.
Phantom-Lite	Displays with flashers	Armstrong Cork Co., Lancaster, Pa.
Phenix	Glass bottles	Phoenix Metal Cap Co., Chicago, Ill.
Phoenix	Band cap Cone top can	Hinde & Dauch Paper Co., Sandusky, O.
Photomailer	Mailing envelopes	F. G. Findley Co., Milwaukee, Wis.
Pick-eh	Glue	Pie-Pak Co., Inc., Hoboken, N. J.
Pie-Pak	Container for pies	Aluminum Seal Co., New Kensington, Pa.
Pilfer-Proof	Bottle closure	Chas. W. Williams & Co., Inc., New York, N. Y.
Pin Stripes	Box covering paper	The Marvellum Co., Holyoke, Mass.
Pintex	Printed box paper	Hazen Paper Co., Holyoke, Mass.
Pique	Embossed mica paper	Holyoke Card & Paper Co., Springfield, Mass.
Pique Embossed	Box covering paper	Hazen Paper Co., Holyoke, Mass.
Plaid Sheen	Embossed mica paper	

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TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
PlainLid	Ointment boxes	Columbia Specialty Co., Inc., Baltimore, Md.
Planet	Sealing tapes	McLaurin-Jones Co., Brookfield, Mass.
Plaskon	Urea formaldehyde molding compound	Plaskon Div., Libbey-Owens-Ford Glass Co., Toledo, O.
Plastacele	Cellulose acetate sheeting and molding powder	E. I. du Pont de Nemours & Co., Inc., Arlington, N. J.
Plastek	Color printed and embossed friction glazed papers and boards	Keller-Dorian Corp., New York, N. Y.
Plasticap	Molded caps	Anchor Hocking Glass Corp., Lancaster, Ohio
Plastic Basket	Fancy paper	Louis Dejonge & Co., New York, N. Y.
Plasticolor	Cellulose laminated cover paper	The Dobeckmun Co., Cleveland, O.
Plasticote	Plastic nameplates and signs	Foxon Co., Providence, R. I.
Plastik Foil	Roll leaf for plastics	Peerless Roll Leaf Co., Union City, N. J.
Plateglassine	Bleached glassine	Deerfield Glassine Co., Monroe Bridge, Mass.
Platelustre	Transparent colored lacquers	Maas & Waldstein Co., Newark, N. J.
Plexiglas	Methyl methacrylate molding compound	Rohm & Haas Co., Phila., Pa.
Plistab	Synthetic resin adhesives	Paisley Products, Inc., Chicago, Ill.
Pli-Fast	Sealing tapes	Rexford Paper Co., Milwaukee, Wis.
Plio	Pliofilm ribbon	Freydberg Bros.-Strauss, Inc., New York, N. Y.
Pliofilm	Transparent rubber-hydrochloride	Goodyear Tire & Rubber Co., Akron, O.
Pliolite	Liquid protective coating	The Goodyear Tire & Rubber Co., Akron, O.
Plio-Ribbon	Printed pliofilm ribbon	Freydberg Bros.-Strauss, Inc., New York, N. Y.
Pliosuede	Velour pliofilm	Cellusuede Products, Inc., Rockford, Ill.
Plio-Tye	Plastic coated material made of pliofilm	Freydberg Bros.-Strauss, Inc., New York, N. Y.
Plyglass	Multi-ply laminated glassine	Deerfield Glassine Co., Monroe Bridge, Mass.
Ply-Metal	Foil containers	Reynolds Metals Co., Richmond, Va.
Plymouth	Paper drinking cups	The American Paper Goods Co., Kensington, Conn.
Pocono	Box cover paper	Matthias Paper Corp., Phila., Pa.
Polymerin	Speed-bake enamel finish	Ault & Wiborg, Div. Interchemical Corp., New York, N. Y.
Polymex	Baking enamel for low temperature treatment	Ault & Wiborg, Div. Interchemical Corp., New York, N. Y.
Pony Gummer	Small table gummer	New Jersey Machine Corp., Hoboken, N. J.
Pony Labelrite	Midget labeling machine	New Jersey Machine Corp., Hoboken, N. J.
Popular Priced	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Porcell	Containers, molded pulp	American Lace Paper Co., Milwaukee, Wis.
Porthos	Cover paper	United Mfg. Co., Springfield, Mass.
Port Low	Portable gravity sections	The Alvey-Ferguson Co., Cincinnati, O.
Postalett	Pocket letter scales	The Exact Weight Scale Co., Columbus, O.
Pour-Aid	Liquor pourer	Lanfare Molded Products, Toledo, O.
Pour-N-Seal	Initial and re-sealing cap with lever and pouring spout	Continental Can Co., New York, N. Y. The Crown Cork & Seal Co., Baltimore, Md. Williams Sealing Corp., Decatur, Ill.
Pouring-Pull	Milk bottle cap	Sealright Co., Inc., Fulton, N. Y.
Powrweld	Foot power bag crimper	Cleveland Crimping Press Co., Cleveland, O.
Pre-Decal	Truck signs and lettering	The Meyercord Co., Chicago, Ill.
Precision	Medicinal droppers	Pennsylvania Glass Products Co., Pittsburgh, Pa.
Prepak	Corrugated boxes	The Hinde & Dauch Paper Co., Sandusky, O.
Pres-A-Ply	Pressure sensitive labels	Dennison Mfg. Co., Framingham, Mass.
Presit	Liquid dispensers	The Food Dispenser Co., Hartford, Conn.
Presto	Box and label printing machines	Markem Machine Co., Keene, N. H.
Prestomark	Heat applied labels	Kaumagraph Co., Wilmington, Del.
Price It	Stock design cellophane bags	Food Packaging, Div. of Milprint, Inc., Milwaukee, Wis.,
Print-Ad-String	Cotton tape	Chicago Printed String Co., Chicago, Ill.
Print-a-Wrap	Cellophane sheets and rolls	Oneida Paper Prods., Inc., New York, N. Y.; also Continental Bag Specialties Corp., New York, N. Y.
Printcolor	Process for dyeing all form of Cellulose Acetate and Acetate Butyrate (Tenite II)	Printloid, Inc., New York, N. Y.
Print-Cote	Protective overprint for coating printed sheets of cellulose acetate	Printloid, Inc., New York, N. Y.
Printfold	Transparent containers	Printloid, Inc., New York, N. Y.
Print-O	Waxed wrapping paper	Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Printweigh	Weight printing scale	Toledo Scale Co., Toledo, O.
Pris-O-Matic	Easy loading "Cellophane" bags	The Dobeckmun Co., Cleveland, O.
Producer	Wrappers	Gellman Mfg. Co., Rock Island, Ill.
Progressive-Net	Open mesh bags for produce	Progressive Bag Co., Inc., New Haven, Conn.
Pro-Lac	Decalcomania transfers	Process Displays, Inc., Milwaukee, Wis.
Prosperity	Meat wrapping paper	Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Protectall	Fibreboard and corrugated board boxes	Container Corp. of America, Chicago, Ill.
Protection-Plus	Special bags for food and chemicals	Equitable Paper Bag Co., Inc., Long Island City, N. Y.
Protectopac	Specialty wraps	Milprint, Inc., Milwaukee, Wis.
Protek-Sorb	Silica gel	Davison Chemical Corp., Baltimore, Md.
Protekter	Moth-repellent paper	Central States Paper & Bag Co., St. Louis, Mo.
Protektol	Transparent stripping lacquer	Ault & Wiborg, Div. Interchemical Corp., New York, N. Y.
Protek	Padding	American Lace Paper Co., Milwaukee, Wis.
Protinol	Label adhesive	The Fales Chemical Co., Inc., Cornwall Landing, N. Y.
Proxmelt	Coatings and adhesives	Pyroxylin Products, Inc., Chicago, Ill.
Proxmesh	Closed mesh fabrics	Pyroxylin Products, Inc., Chicago, Ill.
Prystal	Clear cast phenolic plastic	Catalin Corp., New York, N. Y.
Pure-Cone	Paper bottle	Sutherland Paper Co., Kalamazoo, Mich.
Pure Pail	Ice cream package	Bloomer Bros. Co., Newark, Wayne Co., New York State.
Pure Pak	Milk containers	Fibreboard Prods., Inc., San Francisco, Calif.
Pure Pak	Milk blanks	Gardner-Richardson Co., Middletown, O.
Pure-Pak	Paper milk containers	American Paper Bottle Co., Toledo, O.
Pure-Pak	Milk containers	Single Service Containers, Inc., New York, N. Y.
Pure-Pak	Non-toxic paste	National Adhesives, Div. National Starch Products, Inc., New York, N. Y.
Puritan	Paper drinking cups	The American Paper Goods Co., Kensington, Conn.
Puritan	Milk blanks	Gardner-Richardson Co., Middletown, O.
Puro Pak	Poultry box lining waxed paper	Central Waxed Paper Co., Chicago, Ill.
Purse Kit	Cosmetic kit	Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.
Pyralin	Cellulose nitrate (pyroxylin)	E. I. du Pont de Nemours & Co., Inc., Arlington, N. J.
Pyralon	Box paper	The Marvellum Co., Holyoke, Mass.
Pyrette	Box paper	Kupfer Bros. Co., New York, N. Y.
Pyrex	Corning glass products	Corning Glass Works, Corning, N. Y.
Pyrodescent	Iridescent or pearl papers	Pyrotex Leather Co., Leominster, Mass.
Pyro-Seal	Pyroxylin coated paper	Bradner Smith & Co., Chicago, Ill.
Pyro Sheen	Pyroxylin coated papers	Pyrotex Leather Co., Leominster, Mass.
Pyroxcote	Lacquer and protective coatings	Pyroxylin Products, Inc., Chicago, Ill.
Q. E. D.	Bottle label gum	F. G. Findley Co., Milwaukee, Wis.
Quadrimatic	Transparent bag of exceptional strength	The Dobeckmun Co., Cleveland, O.
Quick	Printing inks, lithographic supplies	International Printing Ink, Div. Interchemical Corp., New York, N. Y.
Quick Pac	Cracker caddy	Robert Gair Co., Inc., New York, N. Y.
Quick-Set Compound	Printing ink	Sigmund Ullman Co., Div. General Printing Ink Corp., Bronx, N. Y.
Quikseal	Closure	Owens-Illinois Glass Co., Toledo, O.
Quik-Set	Folding carton	Robert Gair Co., Inc., New York, N. Y.
R.C.Chip	Super finish chip board	The Butterfield-Barry Co., New York, N. Y.
R-V-Food	Frozen food cartons	Arvey Corp., Chicago, Ill. & Jersey City, N. J.
R-V-Lite	Transparent window material	Arvey Corp., Chicago, Ill. & Jersey City, N. J.
Radiant	Embossed paper—not coated	Hampden Glazed Paper & Card Co., Holyoke, Mass.
Rainbow	Paper for box coverings	Penobscot Paper Co., New York, N. Y.
Rainbow	Flint paper	Bradner Smith & Co., Chicago, Ill.
Rainbow	Reinforced cellophane bags	The Munson Bag Co., Cleveland, O.
Rainbow	Box Covering Paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Rapid Power Boosters	Power-driven belt stackers	The Rapids-Standard Co., Inc., Grand Rapids, Mich.
Rapidwheel	Gravity conveyors	The Rapids-Standard Co., Inc., Grand Rapids, Mich.
Rarewood	Woodgrain box papers	Hazen Paper Co, Holyoke, Mass.
Rayette	Box paper	Kupfer Bros. Co., New York, N. Y.

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Rayon	Mica coated paper	The Marvellum Co., Holyoke, Mass.
Rayon-Bow	Rayon ties	Fibre Cord Co., New York, N. Y.
Ray-Rib	Rayon ribbon	Fibre Cord Co., New York, N. Y.
Real	Greaseproof	Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Really Fla	Gummed papers	Mid-States Gummed Paper Co., Chicago, Ill.
Red Core	Gummed paper tape	Rexford Paper Co., Milwaukee, Wis.
Red Diamond	Automatic labeling machine	The Liquid Carbonic Corp., Chicago, Ill.
Reddiwrap	Greaseproof wrap for liners, etc.	Riegel Paper Corp., New York, N. Y.
Red Stripe	Extra heavy box cambric	Rexford Paper Co., Milwaukee, Wis.
Reel-Hide	Box cover paper	Matthias Paper Corp., Phila., Pa.
Reel-Pak	Fibre film boxes	Gaylord Container Corp., St. Louis, Mo.
Reflectone	Flint glazed papers	Wyomissing Glazed Paper Co., Reading, Pa.
Reilly Indur	Molding powders & phenol-formaldehyde resins, varnishes, etc.	Reilly Tar & Chemical Corp., Indianapolis, Ind.
Reindeer	Fancy paper	Louis Dejonge & Co., New York, N. Y.
Renaissance	Embossed mica paper	Hazen Paper Co., Holyoke, Mass.
Renicote	Metallic printing stock for box covering	Reynolds Metals Co., Richmond, Va.
Repaco	Wrappers—indented inner and outer wraps	The Republic Paperboard Co., Cincinnati, O.
Repelall	Protective paper	Hazen Paper Co., Holyoke, Mass.
Reptile	Fancy paper	Louis Dejonge & Co., New York, N. Y.
Re-Seal-It	Re-sealing bottle caps	Reynolds Metals Co., Richmond, Va.
Resimene	Melamine plastics	Monsanto Chemical Co., Plastics Div., Springfield, Mass.
Resinox	Phenolic plastics and adhesives	Monsanto Chemical Co., Plastics Div., Springfield, Mass.
Revelation	Cellophane wrappers and bags	Milprint, Inc., Milwaukee, Wis.
Revolving Merchandiser	Electric turntables	Motion Displays, Inc., Bklyn, N. Y.
Rex	Conveyor	Chain Belt Co., Milwaukee, Wis.
Reyco	Metal bottleneck wraps	Reynolds Metals Co., Richmond, Va.
Reycraft	Corrugated decorative display papers and boards	The Reyburn Mfg. Co., Inc., Phila., Pa.
Reycurv	Corrugated decorative display papers and boards	The Reyburn Mfg. Co., Inc., Phila., Pa.
Reydec	Corrugated decorative display papers and boards	The Reyburn Mfg. Co., Inc., Phila., Pa.
Reyflute	Corrugated decorative display papers and boards	The Reyburn Mfg. Co., Inc., Phila., Pa.
Reytone	Corrugated decorative display papers and boards	The Reyburn Mfg. Co., Inc., Phila., Pa.
Reytrim	Corrugated decorative display papers and boards	The Reyburn Mfg. Co., Inc., Phila., Pa.
Rezirtol	Varnished paper liner	General Felt Products, Inc., Bklyn, N. Y.
Rhomboid	Display carton	Robert Gair Co., Inc., New York, N. Y.
Ribbon and Pine	Fancy paper	Louis Dejonge & Co., New York, N. Y.
Ribbonette	Cotton ribbon	Chicago Printed String Co., Chicago, Ill.
Rib-Sheen	Embossed mica paper	Hazen Paper Co., Holyoke, Mass.
Richleaf Gold and Platinum	Casein metallic coated papers	Hampden Glazed Paper & Card Co., Holyoke, Mass.
Ridgelo	Clay coated, metallic coated, brush finish, laminated boxboards	Lowe Paper Co., Ridgefield, N. J.
Riegeline	Transparent glassine	Riegel Paper Corp., New York, N. Y.
Riegelite	Transparent waxed glassine	Riegel Paper Corp., New York, N. Y.
Rim Grip	Beaded tumbler caps	Swan Metal Cap Co., Inc., Chicago, Ill.
Rimseal	Closures	The Aridor Co., Chicago, Ill.
Ripco	Greaseproof paper	Rhinelander Paper Co., Rhinelander, Wis.
Ripco Auto-Pak	Greaseproof innerwrap	Rhinelander Paper Co., Rhinelander, Wis.
Rip-Cord	Device for closing cotton and burlap bags	Bemis Bro. Bag Co., St. Louis, Mo.
Riplette	Box paper	Kupfer Bros. Co., New York, N. Y.
Ripple	Box cover	District of Columbia Paper Mills, Inc., Washington, D. C.
Ripplekraft	Non-waterproof crinkled wrapper	Angier Corp., Framingham, Mass.
Rippletone	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Rippl'Tie	Ribbons	Chicago Printed String Co., Chicago, Ill.
Rite-Price	Stock printed cellophane bags	The Dobeckmun Co., Cleveland, O.
Rite-Seal	Carton sealing liquid adhesive	Stein, Hall Mfg. Co., Chicago, Ill.
Rite-Way	Bags and wrapping paper	Gaylord Container Corp., St. Louis, Mo.
Rocketie	Box paper	Kupfer Bros. Co., New York, N. Y.
Roller Set	Roller marking and stenciling	Floquil Products, Inc., New York, N. Y.
Roll-Rite	Rolling pin	Owens-Illinois Glass Co., Toledo, O.

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Rose	Display box	Morris Paper Mills, Chicago, Ill.
Rotokits	Containers for spices, herbs and salts	Gutterson & Co., Inc., New York, N. Y.
Rotopaque	Printing process for transparent film	The Munson Bag Co., Cleveland, O.
Roto Prints	Metallic box covering paper	Holyoke Card & Paper Co., Springfield, Mass.
Rotoseal	Carton forming, lining, folding, closing, machine	Interstate Folding Box Co., Middletown, O.
Rovanesis—RO	Roll-on tamperproof over standard roll-on	Aluminum Seal Co., New Kensington, Pa.
Royal	Protective milk bottle hoods	Reynolds Metals Co., Richmond, Va.
Royal Satin	Super finish news board	The Butterfield-Barry Co., Inc. New York, N. Y.
Royal Satin	Quality newsboard for quality boxes	The Butterfield-Barry Co., Inc., New York, N. Y.
Royal Swan	Ribbons and ties	Stark Bros. Ribbon Co., New York, N. Y.
R.T.G.	Folding cartons and displays	The Richardson Taylor-Globe Corp., Cincinnati, O.
Rushlac	Imitation English grass paper	Paper Affiliates Co., Inc., New York, N. Y.
S Brand	Greaseproofing and moisture-resistant agent	Philadelphia Quartz Co. Phila., Pa.
SKS	Flexible non-warp glue	Paisley Products, Inc., Chicago, Ill.
S & S	Filling, packaging machines	Stokes & Smith Co., Frankford, Phila., Pa.
S T	Double shell caps	Phoenix Metal Cap Co., Chicago, Ill.
Safedge	Tumblers	Owens-Illinois Glass Co., Toledo, O.
Sal-Eg	Cushion bottom egg carton	Sutherland Paper Co., Kalamazoo, Mich.
Safe Myx	Spray solution	Triangle Ink & Color Co., Inc., Bklyn, N. Y.
Safe Pack	Automatic egg carton	Grant Paper Box Co., Pittsburgh, Pa.
Safetex	Gummed paper sealing tape	Central Paper Co., Menasha, Wis.
Safetex	Carton for textile products	Shuttleworth Carton Co., Inc., New York, N. Y.
Safe-T-Seal	Sealing tape	Rexford Paper Co., Milwaukee, Wis.
Safety-Seal	Mailing boxes	W. H. Deisroth Co., Inc., Phila., Pa.
Safeway	Counter rolls of cellophane and roll cutters	Safeway Products Corp., New York, N. Y.
Saflex	Safety glass plastic, vinyl acetal	Monsanto Chemical Co., Plastics Div., Springfield, Mass.
Sal-T-Loid	Cellulose acetate boxes	Parfait Powder Puff Co., Chicago, Ill.
St. Albans	Colored design papers	Stevens-Nelson Paper Corp., New York, N. Y.
St. Valentine	Box paper	Kupfer Bros. Co., New York, N. Y.
Salers	Full color advertising folders	Stecher-Traung Lithograph Corp., Rochester, N. Y.
Sales Appeal	All coated moistureproof bags	Paramount Paper Products Co., Inc., Phila., Pa.
Salespackage	Glass containers	Owens-Illinois Glass Co., Toledo, O.
Salvage Kraft	Obliterating former markings	Floquil Products, Inc., New York, N. Y.
Sandalwood	Imitation wood grain box covers	District of Columbia Paper Mills, Inc., Washington, D. C.
Sani-Glas	Processed sterilized prescription bottles	Brockway Glass Co., Inc., Brockway, Pa.
Saniseal	Milk and demijohn closure	Ferdinand Gutmann & Co., Bklyn, N. Y.
Sani-Sherm	Fluted liners	Sherman Paper Products Corp., Newton Upper Falls, Mass.
Sanitair	High-speed automatic rotary air cleaner	U. S. Bottlers Machinery Co., Chicago, Ill.
Sanitape	Tablet packager	Ivers-Lee Co., Newark, N. J.
Sanitape-Sealtite	Heat-sealed, unit packages of tablets, capsules, pills	Ivers-Lee Co., Newark, N. J.
Sani-Trete	Condiment dispensers	Imperial Molded Products Corp., Chicago, Ill.
Saran	Moisture impervious packaging film	The Dow Chemical Co., Midland, Mich.
Saranac	Wire stitching machines	Saranac Machine Co., Benton Harbor, Mich.
Sateen	Mica embossed	Hampden Glazed Paper & Card Co., Holyoke, Mass.
Satinettes	Box paper	Kupfer Bros. Co., New York, N. Y.
Satin-Glo	Display fabric	Columbus Coated Fabrics Corp., Columbus, O.
Satintone	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Satintone	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Satinwood	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Save-A-Seal	Closure	Owens-Illinois Glass Co., Toledo, O.
Scotch	Cellulose tape, pressure sensitive	Minnesota Mining & Manufacturing Co., St. Paul, Minn.
Scotch fabrics	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Scotch Plaids	Paper for box coverings	Pejepscot Paper Co., New York, N. Y.
Scotchweave	Box covers	District of Columbia Paper Mills, Inc., Washington, D. C.
Scott	Net weighers and filling machines	U. S. Automatic Box Machinery Co., Inc., Roslindale, Boston, Mass.
Scuff-Proofed	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Seal-Prof	Box cover paper	Matthias Paper Corp., Phila., Pa.

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TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Scutan	Waterproof paper	Union Bag & Paper Corp., Scutan Div., New York, N. Y.
Seafoam	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Seal-All	Glue	The F. G. Findley Co., Milwaukee, Wis.
Seal Brand	Adhesives	Philadelphia Quartz Co., Phila., Pa.
Sealcone	Paper container	American Sealcone Corp., New York, N. Y.
Seal-Kap	Milk bottle caps	American Seal-Kap Corp., Long Island City, N. Y.
Se-Ali	Jars and bottles	Owens-Illinois Glass Co., Toledo, O.
Sealon	Hooded milk bottle closure	Sealright Co., Inc., Fulton, N. Y.
Sealright	Protective paper containers	Sealright Co., Inc., Fulton, N. Y.
Seal-Spout	Aluminum pouring spout	American Aluminum Ware Co., Newark, N. J.
Sealtight	Sealing machines	Heat Seal-It Co., Phila., Pa.
Sealtight	Bag closing machine	Miller Wrapping & Sealing Machine Co., Chicago, Ill.
Sealtite	Automatic bag filling and bag sealing machines	Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Sealtite	Dry cold water-soluble glue	National Adhesives, Div. of National Starch Products, Inc., New York, N. Y.
Sealtite-Uniwrap	Individual label attached package	Ivers-Lee Co., Newark, N. J.
Sealtonic	Wetting agent	Seal, Inc., Shelton, Conn.
Seal Top	Spouted closure	Plastic Engineering, Inc., Cleveland, O.
Seal-Tye	Combination pasted and metal tie closure	Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Sealz	Hot melts	Dispersions Process, Inc., New York, N. Y.
Sebrof	Poster making process	The Forbes Lithograph Mfg. Co., Boston, Mass.
Secure-Seal	Metal screw closures	West Penn Mfg. & Supply Corp., Brackenbridge, Pa.
Security Stitcher	Wire stitching and stapling machine	Paslode Co., Chicago, Ill.
See-Thru	Rigid transparent container	Geo. V. Clark., Inc., Long Island City, N. Y.
Selectrol	Automatic checkweigher	The Exact Weight Scale Co., Columbus, O.
Self-Locking	Egg carton	Self-Locking Carton Co., Chicago, Ill.
Self Seal	Open end envelopes	U. S. Envelope Co., Springfield, Mass.
Sell-O-Face	Window bags and wraps	Thomas M. Royal & Co., Phila., Pa.
Sell-O-Royal	Cellophane bags and sheets	Thomas M. Royal & Co., Phila., Pa.
Selmor	Display stands	Hinde & Dauch Paper Co., Sandusky, O.
Semi-Seal	Cellophane glued to backboard	Milprint, Inc., Milwaukee, Wis.
Senior Krimper	Light weight jaw type krimper for bags	Pack-Rite Machine Corp., Milwaukee, Wis.
Sentry-Seal	Closure	Owens-Illinois Glass Co., Toledo, O.
Serpette	Box paper	Kupfer Bros. Co., New York, N. Y.
Servseal	Combination closure and dispenser	Guardian Safety Seal Co., Chicago, Ill.
Servitex	Imitation leather	Cincinnati Industries, Cincinnati (Lockland), O.
Seybold	Paper cutters	Harris-Seybold-Potter Co., Dayton, O.
Seybold Precision	Die presses	Harris-Seybold-Potter Co., Dayton, O.
Seymour	Decorated metal containers	Seymour Products Co., Seymour, Conn.
Shadotone	Printing ink	Sigmund Ullman Co., Div. General Printing Ink Corp., Bronx, N. Y.
Shadowgraph	Scales	The Exact Weight Scale Co., Columbus, O.
Shadowplaid	Fancy paper	Louis Dejonge & Co., New York, N. Y.
Sheer Sheen	Mica box papers	Hazen Paper Co., Holyoke, Mass.
Sheffelloy	Collapsible tube metal	New England Collapsible Tube Co., Chicago, Ill.
Sheffield Process	Method of tempering metals	New England Collapsible Tube Co., Chicago, Ill.
Shelpco 4 Star	Silver chests for packaging silverware	Henry H. Sheip Mfg. Co., Phila., Pa.
Shellback	Double shell caps	Anchor Hocking Glass Corp. Lancaster, O.
Shell-Tint	Transparent tint over portions of transparent cellulose wraps	Shellmar Products Co., Mt. Vernon, O.
Shell-Glo	Clear transparent laminated cellulose	Shellmar Products Co., Mt. Vernon, O.
Shell-Pax	Transparent cellulose containers	Shellmar Products Co., Mt. Vernon, O.
Shell-Pli	Printed laminated cellulose	Shellmar Products Co., Mt. Vernon, O.
Shell-Vue	Transparent gummed acetate posters	Shellmar Products Co., Mt. Vernon, O.
Shnflex	Protective coating compounds	Gordon-Lacey Chemical Products Co., Maspeth, L. I., N. Y.
Shoksorb	Indented packing paper	Schmidt & Ault Paper Co., York, Pa.
Shopak	Transparent acetate containers	Shaw Paper Box Co., Meriden, Conn.
Showbox	Transparent boxes	Central States Paper & Bag Co., St. Louis, Mo.
Showmaster	Electric turntables	Motion Displays, Inc., Bklyn, N. Y.
Shu-Pac	Shoe boxes	Gordon-Lavin Paper Box Co., Inc., Baltimore, Md.
Shy-Nee	Printing inks, lithographic supplies	International Printing Ink, Div. Interchemical Corp., New York, N. Y.
Signodes	Steel strapping	Signode Steel Strapping Co., Chicago, Ill.
Silidex	Dry, cold water soluble adhesive	National Adhesives, Div. National Starch Products, Inc., New York, N. Y.
Silk Sheen	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Silray	Silver coated paper	The Marvellum Co., Holyoke, Mass.
Silvalum	Silver embossed paper	Springfield Coated Paper Corp., Camden, N. J.
Silveneer	Printing inks	Sigmund Ullman Co., Div. General Printing Ink Corp., Bronx, N. Y.
Silver Beams	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Silver Foil 1941	Metallic coated, silver, plain and embossed	Louis Dejonge & Co., New York, N. Y.
Silvergloss	Silver print paper	The Marvellum Co., Holyoke, Mass.
Silver King	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Silverlink	Roller chain	Link-Belt Co., Chicago. Ill.
Silver Mosaic	Brightwood kid finish papers	Holyoke Card & Paper Co., Springfield, Mass.
Silver Plaid	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Silverseal	Colored specialty tape	Gummed Tape & Devices Co., Bklyn, N. Y.
Silversheen	Printing ink	Sigmund Ullman Co., Div. General Printing Ink Corp., Bronx, N. Y.
Silver Shredder	Paper shredding machine	Industrial Shredder & Cutter Co , Salem, O.
Silverstitch	Stapling wire	Acme Steel Co., Chicago, Ill.
Silverstitcher	Stitching machine	Acme Steel Co., Chicago, Ill.
Silverstreak	Silent chain	Link-Belt Co., Chicago, Ill.
Silvertone	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Silvertone	Metallized cellulose ribbon	Fibre Cord Co., New York, N. Y.
Sil-Vor-Plate	Aluminum bronze ink	Geo. H. Morrill Co., Div. General Printing Ink Corp., New York, N. Y.
Sim-Pac	Folding boxes shipped flat	Paper Package Co., Indianapolis, Ind.
Simplex	Wire staples	Acme Staple Co., Camden, N. J.
Simplex	Packages sealers, gummed tape	Better Packages, Inc., Shelton, Conn.
Simplex	Pie and cake container	Milprint, Inc., Milwaukee, Wis.
Simplex	Folding paper boxes	Simplex Paper Box Corp., Lancaster, Pa.
Simplex Hi-Speed	Bag making machine	Miller Wrapping & Sealing Machine Co., Chicago, Ill.
Single Plate	Filter	Karl Kiefer Machine Co., Cincinnati, O.
Singletin	One-use collapsible tube	Victor Metal Products Corp., Bklyn, N. Y.
Singl-Vu	Window cartons	Rossotti Lithographing Co., Inc., N. Bergen, N. J.
Skytogen	Box paper	Kupfer Bros. Co., New York, N. Y.
Skytone	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Slak-Tite	Closure for slack filled paper bag	Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Slant Side	Sloping side folding box	Michigan Carton Co., Battle Creek, Mich.
SlideLid	Tablet boxes	Columbia Specialty Co., Inc., Baltimore, Md.
Slide Off	Decalcomania trademarking	The Palm Bros. Decalcomania Co., Cincinnati, O.
Smithcraftd	Metal wood leatherette boxes and displays	The S. K. Smith Co., Chicago, Ill.
Snack-Sacks	Sandwich bags	Thomas M. Royal & Co., Phila., Pa.
Snac-Pak	Corrugated basket container for cakes	The Ashtabula Corrugated Box Co., Ashtabula, O.
Snake Tape	Gummed tape	Angier Corp., Framingham, Mass.
Snap-Loks	Attaching device embedded in tag	Dennison Mfg. Co., Framingham, Mass.
Snap-on	Cap for application to reuse tumblers	Sterling Seal Co., Erie, Pa.
Snopaque	Opaque, white glassine	Riegel Paper Corp., New York, N. Y.
Snowcap	Lining paper	Bradner Smith & Co., Chicago, Ill.
Snowdrift	Greaseproof paper	Rhinelander Paper Co., Rhinelander, Wis.
Snowflake	Padding	American Lace Paper Co., Milwaukee, Wis.
Snowflake and Star	Box covering paper	Holyoke Card & Paper Co., Springfield, Mass.
Snow White Litho	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Snowhite Stiktite	Box wrap	Fitchburg Paper Co., Fitchburg, Mass.
Solac	Cellulose cement	Mass & Waldstein Co., Newark, N. J.
Solar	Box covers	District of Columbia Paper Mills, Inc., Washington, D.C.
Solderite	Can spouts	Standard Specialty & Tube Co., New Brighton, Pa.
Solidry	Inks and varnishes	Pope & Gray, Inc., New York, N. Y.
Sonsettes	Box paper	Kupfer Bros. Co., New York, N. Y.
Sorbolite	Light proof board	Waldorf Paper Products Co., St. Paul, Minn.

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TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Sorting Scale	Automatic continuous check-weighing and sorting scale	Merrick Scale Mfg. Co., Passaic, N. J.
Spede-Pac	Ice cream pail	Bloomer Bros. Co., Newark, Wayne Co., New York State
Speedliseal	Tablet tape	Gummed Tape & Devices Co., Bklyn, N. Y.
Speed Limit	Halftone black inks	International Printing Ink Div. of Interchemical Corp., New York, N. Y.
Spee-D-Mark	Cellulose bags	U. S. Envelope Co., Springfield, Mass.
Speedweigh	Over and under checking scale	Toledo Scale Co., Toledo, O.
Speed-Wrap	Automatic sheeting and gluing machine	Miller Wrapping & Sealing Machine Co., Chicago, Ill.
Speedway	Motors and display turntables	Speedway Mfg. Co., Cicero, Ill.
Sphinx	Adhesive	Arabol Mfg. Co., New York, N. Y.
Spiralon	Flint and foil box papers	Hazen Paper Co., Holyoke, Mass.
Spongeflex	Flexible non-warp glues	Paisley Products, Inc., Chicago, Ill., also New York, N. Y.
Sport-Art	Fancy paper	Louis Dejonge & Co., New York, N. Y.
Spot Lite	Glassine wrappers	Milprint, Inc., Milwaukee, Wis.
Sprague	Canning machinery	Food Machinery Corp., Sprague-Sells Div., Hoopeston, Ill.
Springtime Line	Box cover paper	Matthias Paper Corp., Phila., Pa.
Spun-Sheen	Embossed mica paper	Hazen Paper Co., Holyoke, Mass.
Square-Pak	Paraffined ice cream container	The Menasha Products Co., Div. Marathon Paper Mills Co., Menasha, Wis.
Square Sheen	Embossed mica paper	Hazen Paper Co., Holyoke, Mass.
Square-Tex	Printed box paper	The Marvellum Co., Holyoke, Mass.
Sta-Ahead	Hat stickers	Gummed Tape & Devices Co., Bklyn, N. Y.
Sta-Fresh	Waxed glassine bags	Oneida Paper Products, Inc., New York, N. Y., also Continental Bag Specialties Corp., New York, N. Y.
Sta-Seal	Machines, wrapping	Battle Creek Break Wrapping Machine Co., Battle Creek, Mich.
Stainless	Metal foils	Keller-Dorian Corp., New York, N. Y.
Standard	Labeling machine and accessories	Liquid-Carbonic Corp., Chicago, Ill.
Standard	Taping devices	Gummed Tape & Devices Co., Bklyn, N. Y.
Standee	Automatic multiwall paper bags	Union Bag & Paper Corp., New York, N. Y.
Stannam	Liquid paste	National Adhesives, Div. of National Starch Products, Inc., New York, N. Y.
Stapak	Fibre shipping drums	The Container Co., Van Wert, O.
Staplecraft	Hand, foot, motorized stapling machines	Acme Staple Co., Camden, N. J.
Star	Adhesive	Bingham Bros. Co., New York, N. Y.
Star	Fountain marker	Wm. A. Force & Co., Inc., Bklyn, N. Y.
Star and Step	Box covers	District of Columbia Paper Mills, Inc., Washington, D.C.
Star Brand	Adhesives	Bingham Bros. Co., New York, N. Y.
Stardust	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Star Sheen	Embossed mica paper	Hazen Paper Co., Holyoke, Mass.
Staybound	Cold process padding gum	The Commercial Paste Co., Columbus, O.
Staystuck	Crown closure	Ferdinand Gutmann & Co., Bklyn, N. Y.
Staytite	Gummed stay tape	Bradner Smith & Co., Chicago, Ill.
Steel-Forged	Casters	The Rapids-Standard Co., Inc., Grand Rapids, Mich.
Steel-Set	Industrial all-purpose repair glue	Paisley Products, Inc., Chicago, Ill.
Steelstrap	Steel strapping	Acme Steel Co., Chicago, Ill.
Stek-O	Labeling paste powder	Clark Stek-O Corp., Rochester, N. Y.
Sterilined	Inner lined containers	The Interstate Folding Box Co., Middletown, O.
Sterling Tread	Gummed paper tape	The Gummed Products Co., Troy, O.
Stikfast	Label pasters	Diagraph-Bradley Stencil Machine Corp., St. Louis, Mo.
Stiktolin	Adhesive for labeling metal containers	Marks Chemical Works, New York, N. Y.
Streamer Bows	Pre-tied cellulose bows	Stark Bros. Ribbon Corp., New York, N. Y.
Stretchwrap	Wrapping machine	Stokes & Smith Co., Frankford, Phila., Pa.
Stripcoat	Hot dip stripping melt	Dow Chemical Co., Midland, Mich.
Stripe & Pine	Fancy printed Christmas papers	Louis Dejonge & Co., New York, N. Y.
Sturdite	Leather cloth	Holliston Mills, Inc., Norwood, Mass.
Style-Curve	Corrugated display material	Sherman Paper Products Corp., Newton Upper Falls, Mass.
Styron	Polystyrene molding granules	The Dow Chemical Co., Midland, Mich.
SUco	Printing ink	Sigmund Ullman Co., Div. General Printing Ink Corp., Bronx, N. Y.

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Suedette	Fancy paper	Louis Dejonge & Co., New York, N. Y.
Sullmanco	Printing ink	Sigmund Ullman Co., Div. General Printing Ink Corp., Bronx, N. Y.
Sunalloy	Tin substitute for tubes	Sun Tube Corp., Hillside, N. J.
Sunburst	Wide mouth food ware	Armstrong Cork Co., Lancaster, Pa.
Sunco	Dry colors	Sun Chemical & Color Co., Div. General Printing Ink Corp., Harrison, N. J.
Sunex	Transparent sheet	American Phenolic Corp., Chicago, Ill.
Sunrise	Sealing tapes	McLaurin-Jones Co., Brookfield, Mass.
Sunshine	Box cover paper	Matthias Paper Corp., Phila., Pa.
Sunshine	Colored coverings	Bradner Smith & Co., Chicago, Ill.
Super-Cell	Egg cartons	Interstate Folding Box Co., Middletown, O.
Superend	Ending glue	National Adhesives, Div. National Starch Products, Inc., New York, N. Y.
Super-Gloss	White ivory embossed and plain papers	The Marvellum Co., Holyoke, Mass.
Superkleen	Bottle washing machine	The Liquid Carbonic Corp., Chicago, Ill.
Superseal	Heat sealing glassine	Hartford City Paper Co., Hartford City, Ind.
Super Seal	Bread wrappers	Menasha Products Co., Div. of Marathon Paper Mills Co., Menasha, Wis.
Super-Seal	Leakproof cellophane bags	The Munson Bag Co., Cleveland, O.
Super-Seal	Glass vacuum jar	Super-Seal Container Corp., Washington, D. C.
Superset	Printing ink	Sigmund Ullman Co., Div. General Printing Ink Corp., Bronx, N. Y.
Superstrip	Stripping glue	National Adhesives, Div. National Starch Products, Inc., New York, N. Y.
Superwrap	Tight wrapping glue	National Adhesives, Div. National Starch Products, Inc., New York, N. Y.
Supreme Blacks	Lithographic inks	E. J. Kelly Co., Kalamazoo, Mich.
Sure Shot	Wire staples	Acme Staple Co., Camden, N. J.
Susan	Rayon acetate fusedge ribbon	Freydberg Bros.-Strauss, Inc., New York, N. Y.
SUtility	Printing inks	Sigmund Ullman Co., Div. General Printing Ink Corp., Bronx, N. Y.
SUtone	Printing inks	Sigmund Ullman Co., Div. General Printing Ink Corp., Bronx, N. Y.
SUvenoor	Printing inks	Sigmund Ullman Co., Div. General Printing Ink Corp., Bronx, N. Y.
Sweatless	Dusting powder for paper workers hands	Paisley Products, Inc., Chicago, Ill.
Sweepstakes	Fancy paper	Louis Dejonge & Co., New York, N. Y.
Sweetone	Geo. H. Sweetnam products	Geo. H. Sweetnam, Inc., Cambridge, Mass.
Sylphcase	Casings for meats	Sylvania Industrial Corp., New York, N. Y.
Sylph-Flake	Sylphrap confetti	Sylvania Industrial Corp., New York, N. Y.
Sylphrap	Transparent cellulose sheeting	Sylvania Industrial Corp., New York, N. Y.
Sylphseal	Bands, viscose (self-sealing)	Sylvania Industrial Corp., New York, N. Y.
Sylph-Thin	Casings for meats	Sylvania Industrial Corp., New York, N. Y.
Synchro Ink	Printing inks, lithographic supplies	International Printing Ink, Div. Interchemical Corp., New York, N. Y.
Syntron	Weighing machines Vibrators and packers	Syntron Co., Homer City, Pa.
Temper-Proof	Rupturing band tamper-proof	Aluminum Seal Co., New Kensington, Pa.
Tap-A-Flow	Closure dispenser	Federal Tool Corp., Chicago, Ill.
Tapogamth	Stripping gum	Stein, Hall Mfg. Co., Chicago, Ill.
Tappit	Liquid dispensers	Food Dispenser Co., Hartford, Conn.
Tarcette	Box paper	Kupfer Bros. Co., New York, N. Y.
Taylor Made	Paper boxes	Taylor Box Co., Providence, R. I.
Tayper	Tape moistening machine	Nashua Package Sealing Co., Inc., Nashua, N. H.
Telestop	Dispensing box	National Folding Box Co., New Haven, Conn.
Television	Metal and cellulose acetate cans	Geo. V. Clark Co., Inc., L. I. C., N. Y.
Tell-U-Tags	Marking tags	Dennison Mfg. Co., Framingham, Mass.
Tenace	Gummed tape	Stein, Hall Mfg. Co., Chicago, Ill.
Tenite	Cellulose acetate molding compound	Tennessee Eastman Corp., Kingsport, Tenn.
Tenite I	Cellulose acetate molding composition	Tennessee Eastman Corp., Kingsport, Tenn.
Tenite II	Cellulose acetate butyrate molding compound	Tennessee Eastman Corp., Kingsport, Tenn.
Texcel Tape	Cellulose pressure sensitive tape	Industrial Tape Corp., New Brunswick, N. J.
Texkraft	Lacquered kraft paper	Textileather Corp., Toledo, O.
Texol	Leatherette	Farrington Mfg. Co., Boston, Mass.

Addresses of companies listed appear on pages 755–763

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Texrope	Multiple V-belt drive	Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Textileather	Lacquered fabric	Textileather Corp., Toledo, O.
Textile Prints	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Textiloid	Lacquered rag paper	Textileather Corp., Toledo, O.
Textolite	Molded, laminated and extruded plastic	General Electric Co., Plastic Div., Pittsfield, Mass.
Thermium	Heat sealing paper and tape	Seal, Inc., Shelton, Conn.
Thermo	Tin printing inks	Crescent Ink & Color Co. of Pa., Phila., Pa.
Thermocurl	Machine, beading ends of plastic cylinders	Taber Instrument Co., N. Tonawanda, N. Y.
Thermodraw	Machine, drawing containers from sheet plastic	Taber Instrument Co., N. Tonawanda, N. Y.
Thermofold	Creasing and folding sheet plastic	Taber Instrument Co., N. Tonawanda, N. Y.
Thermoloid	High relief plastic material	Chaspec Mfg. Co., Inc., New York, N. Y.
Thermo-Matic	Heat-seal label applier	New Jersey Machine Corp., Hoboken, N. J.
Thermo-Phane	Highly moisture resistant, heat sealable, laminated paper	Interstate Folding Box Co., Middletown, O.
Thermoseal	Thermoplastic closure wraps, bags, liners	Benj. C. Betner Co., Devon, Pa.
Therm-O-Top	Heat seal closure	Thomas M. Royal & Co., Phila., Pa.
Thin-Wrap	Machines for wrapping with crimped ends	Miller Wrapping & Sealing Machine Co., Chicago, Ill.
Thistle	All types of adhesives	Arvey Corp., Chicago, Ill. & Jersey City, N. J.
Three in One	Steel strapping tightening, sealing, and cutting tool	Stanley Works, New Britain, Conn.
3-M	Adhesives	Minnesota Mining & Mfg. Co., St. Paul, Minn.
Throway	No deposit, no return throw-away beer bottles	Anchor Hocking Glass Corp., Lancaster, O.
Ticco	General	Triangle Ink & Color Co., Inc., Bklyn, N. Y.
Tie-Tie	Gift wrappings, cards, ribbons, seals	Chicago Printed String Co., Chicago, Ill.
Tiger Stay	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Timely Suggestions	Box paper	Kupfer Bros. Co., New York, N. Y.
Thick	Tin and zinc coated paper and boards	Keller-Dorian Corp., New York, N. Y.
Tindey	Display carton	Robert Gair Co., Inc., New York, N. Y.
Tinstic	Liquid paste	National Adhesives, Div. National Starch Products, Inc., New York, N. Y.
Tin-Tak	Glue	The F. G. Findley Co., Milwaukee, Wis.
Tiny Midget	Static eliminator	The Simco Co., Phila., Pa.
Tiplift	Milk bottle cap	Sealright Co., Inc., Fulton, N. Y.
Tip Off	Closure	Owens-Illinois Glass Co., Toledo, O.
Tite-Fit Tubing	Elastic tubing for covering regular and irregular shaped packages	Bemis Bro. Bag Co., St. Louis, Mo.
Tite-Lok	Square flat cellophane bags	Oneida Paper Products, Inc., New York, N. Y., also Continental Bag Specialties Corp., New York, N. Y.
Titelok	Cylindrical paper container	Sutherland Paper Co., Kalamazoo, Mich.
Tite-Seal	Cellophane bags and liners	Traver Corp., Chicago, Ill.
Tite-Top	Two-piece, locking cover box	National Folding Box Co., New Haven, Conn.
Tone-Craft	Display, corrugated	Sherman Paper Products Corp., Newton Upper Falls, Mass.
Topcote	Moisture-resistant coating	Brooks Bank Note Co., Springfield, Mass.
Topmost	Wire-handle paper pail (tin-seal)	Sutherland Paper Co., Kalamazoo, Mich.
Topper	Bottle carriers	Container Corp. of America, Chicago, Ill.
Traco	Plain and printed cellophane products	Traver Corp., Chicago, Ill.
Traco-Paks	Wrappers for food products	Traver Corp., Chicago, Ill.
Tran-Cel-Seal	Cellulose tape	Gummed Tape & Devices Co., Bklyn, N. Y.
Transeen	Transparent sulphite self-sealing wrappers	Newark Paraffine & Parchment Paper Co., Newark, N. J.
Transel	Printed embossed transparent cellulose	The Marvellum Co., Holyoke, Mass.
Transitone	Leatherette paper	Bradner Smith & Co., Chicago, Ill.
Transol	Solvent for removing transfers	Kaumagraph Co., Wilmington, Del.
Transowrap	Transparent cellulose sheeting	Transolene Co., Barrington, Ill.
Transpak	Chipboard container	Transcontinental Container Corp., Corona, N. Y.
Transplastics	Transparent plastics process	Waterbury Button Co., Plastics Div., Waterbury, Conn.
Trans-Print	Printing on transparent sheeting	The Forbes Litho. Mfg. Co., Boston, Mass.
Translate Bags	Combination cellophane and glassine bags	The Interstate Folding Box Co., Middletown, O.
Transwrap	Automatic packaging machine	Stokes & Smith Co., Frankford, Phila., Pa.
Tra-Pac	Refrigerator ice cream package	Bloomer Bros. Co., Newark, New York State
Trapcote	Grease resistant coating	Brooks Bank Note Co., Springfield, Mass.
Travenbeen	Decorative wrappers and bands	Traver Corp., Chicago, Ill.
Tray-Pax	Transparent cellulose sheet with rigid base or back	Shellmar Products Co., Mt. Vernon, O.
Tredonia	Moistureproof and greaseproof cartons	Fibreboard Products, Inc., San Francisco, Calif.
Tredonia	Moistureproof and greaseproof boxboard and boxes	Grant Paper Box Co., Pittsburgh, Pa.
Tredonia Board	Moistureproof and greaseproof boxboard	The Butterfield-Barry Co., Inc., New York, N. Y.
Trees, Angel, Dear	Fancy-printed Christmas papers	Louis Dejonge & Co., New York, N. Y.
Tricolette	Box paper	Kupfer Bros. Co., New York, N. Y.
Triple Lock	Triple strength bottom cellophane bag	The Dobeckmun Co., Cleveland, O.
Triple Seal	Closure	Owens-Illinois Glass Co., Toledo, O.
Triple-Tec	Double corrugated for packing	Sherman Paper Products Co., Newton Upper Falls, Mass.
Tripletite	Special friction top paint can	Continental Can Co., New York, N. Y.
Triplex	Labeling machines	The Liquid Carbonic Corp., Chicago, Ill.
Tri-Seal	Metal cigar wraps	Reynolds Metals Co., Richmond, Va.
Tri-Sheen	Embossed mica paper	Hazen Paper Co., Holyoke, Mass.
Tritect	Moisture-vaporproof cellulose film	The Dobeckmun Co., Cleveland, O.
Trojan	Gummed paper tape	The Gummed Products Co., Troy, O.
Trophy	Flints and mica	Bradner Smith & Co., Chicago, Ill.
Tru-Art	Pictorials, food—illustrations, labels and cartons	Rossotti Lithographing Co., Inc., N. Bergen, N. J.
Tru-Hue	Patented window and counter displays	James Andrew DeNina, New York, N. Y.
Tru-Pak	Satchel-bottom bags	Cupples-Hesse Corp., St. Louis, Mo.
Trutite	Key opening vacuum can	Continental Can Co., New York, N. Y.
Tru-Tone	Food pictorials for canned goods labels	The U. S. Printing & Lithograph Co., Cincinnati, O.
Tru-Vu	Pictorials, food—illustrations, labels and cartons	Rossotti Lithographing Co., Inc., N. Bergen, N. J.
Try-Sax	Cotton seed bags with trier stripes	Bemis Bro. Bag Co., St. Louis, Mo.
Tubol	Tube winding liquid adhesive	Stein, Hall Mfg. Co., Chicago, Ill.
Tu-Ply	Plywood shipping drum	Seymour & Peck Co., Chicago, Ill.
Tuffy	Nursing bottle (heat resistant glass)	Brockway Glass Co., Brockway, Pa.
Tutone	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Twinkle-Sheen	Embossed mica paper	Hazen Paper Co., Holyoke, Mass.
250 Gum	Adhesives, starch derived	Stein, Hall Mfg. Co., Chicago, Ill.
Two-In-One	Combined letter and sample mailing bag	Bemis Bro. Bag Co., St. Louis, Mo.
TwoTone	Cellophane ribbon	Fibre Cord Co., New York, N. Y.
Two View	Label, food products	Muirson Label Co., Inc., Bklyn, N. Y.
Two Way	Labels for cans and glass	Muirson Label Co., Inc., Bklyn, N. Y.
U.S.	Bottling machinery	U. S. Bottlers Machinery Co., Chicago, Ill.
Ullmanine	Printing ink	Sigmund Ullman Co., Div. General Printing Ink Corp., Bronx, N. Y.
Ultropaque	Printing ink	Sigmund Ullman Co., Div. General Printing Ink Corp., Bronx, N. Y.
Unifoil	Light gauge metal mounted paper backing	Reynolds Metals Co., Richmond, Va.
Unifold	One-piece folding garment box	Gardner-Richardson Co., Middletown, O.
Union	Point-of-sale displays	Union Steel Products Co., Albion, Mich.
Unipolex	Lug cap	National Seal Corp., Bklyn., N. Y.
Uniseal	Can sealing compound	The Max Ams Machines Co., Bridgeport, Conn.
Uniseal-Hermo Oil-proof	Sealing fluid for can ends	The Max Ams Machine Co., Bridgeport, Conn.
Unishell	One piece cap substitute for double shell cap	National Seal Corp., Bklyn., N. Y.
Unishell	Special one-piece screw cap	Continental Can Co., New York, N. Y.
Unitainer	One dose containers	Sun Tube Corp., Hillside, N. J.
United	Box covering and greeting card paper	United Mfg. Co., Springfield, Mass.
Unit Load	Steel band freight bracing method	Acme Steel Co., Chicago, Ill.
Universal	Stenciling fountain brush	Wm. A. Force & Co., Inc., Bklyn, N. Y.
Universal	Filling machines	Stokes & Smith, Frankford, Phila., Pa.
Universal	Tablet counting and filling machine	Ivers-Lee Co., Newark, N. J.
Universal	Conveyor chain	Link-Belt Co., Chicago, Ill.
Universal	Bottle washers	The Liquid Carbonic Corp., Chicago, Ill.
Universal-Kottoner	Cotton wadding machine	Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Upaco	Industrial adhesives	Union Paste Co., Hyde Park, Mass.
U-Press-It	Special opening pouring spout and cap	Continental Can Co., New N. Y.
Urac	Urea-formaldehyde adhesives	American Cyanamid Co., Plastics Div., New York, N. Y.
Utilitape	Cloth pressure sensitive water-resistant tape	Industrial Tape Corp., New Brunswick, N. J.
Utility	Volumetric filler	Triangle Package Machinery Co., Chicago, Ill.

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TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
V-Film	Synthetic transparent sheeting	Goodyear Tire & Rubber Co. Akron, O.
V-Line	Greaseproof, non-corrosive papers	Sherman Paper Products Corp., Newton Upper Falls, Mass.
V P O Closures	Vacuum pry-off metal caps	Crown Cork & Seal Co., Baltimore, Md.
V-Seal	Resin adhesive	National Adhesives, Div. National Starch Products, Inc., New York, N. Y.
Vacutop	Brush and applicator closures	Double Duty Products, Inc., Cleveland, O.
Val Hue	Fused cut edge acetate rayon ribbon	Wm. E. Wright & Sons Co., West Warren, Mass.
Valve	Collapsible tubes	National Collapsible Tube Co., Providence, R. I.
Vanity Line	Box cover paper	Matthias Paper Corp., Phila., Pa.
Vapetex	Thermoplastic coated board	The Interstate Folding Box Co., Middletown, O.
Vapolith	Lithographic inks	International Printing Ink, Div. Interchemical Corp., New., York, N. Y.
Vaporin	Letterpress quick drying ink	International Printing Ink Div. of Interchemical Corp., New York, N. Y.
Vaposeal	Glassine paper lacquer coated	Westfield River Paper Co., Inc., Russell, Mass.
Vaposet	Moisture-set inks	International Printing Ink, Div. Interchemical Corp., New York, N. Y.
Vari-Pitch	Variable speed V-belt transmission	Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Vari-Visco	Filling machine for viscous materials	Karl Kiefer Machine Co., Cincinnati, O.
Vegimal	Liquid tightwrap setup box glue	Paisley Products, Inc., Chicago, Ill.
Velboard	Velour box or chip board	Cellusuede Products, Inc., Rockford, Ill.
Velmar	Waterproof antique coated papers	The Marvellum Co., Holyoke, Mass.
Velmat	Greeting card paper	Springfield Coated Paper Corp., Camden, N. J.
Velmo	Box paper	The Marvellum Co., Holyoke, Mass.
Velvet Chintz	Printed dull coated paper	Hampden Glazed Paper & Card Co., Holyoke, Mass.
Versailles Satintone	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Vibra-Flow	Vibrating feeders, conveyors	Syntron Co., Homer City, Pa.
Vibrox	Vibrating packers	B. F. Gump Co., Chicago, Ill.
Vichrome	Synthetic coating for protection against corrosive agents	Ault & Wiborg, Div. Interchemical Corp., New York, N. Y.
Victoria	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Victorian Floral	Fancy paper	Louis Dejonge & Co., New York, N. Y.
Victor Tape	Printed advertising tape	Chicago Printed String Co., Chicago, Ill.
Victory	Rayon cut edge ribbon	Freydberg Bros.-Strauss, Inc., New York, N. Y.
View Pac	Transparent bags, envelopes, rigid boxes	U. S. Envelope Co., Springfield, Mass.
Vigorette	Box paper	Kupfer Bros. Co., New York, N. Y.
Viking	Cellulose window gluing combining machine	E. G. Staude Mfg. Co., St. Paul, Minn.
Vinicote	Special internal coatings for collapsible tubes	New England Collapsible Tube Co., Chicago, Ill.
Vinylite	Plastics and resins	Carbide & Carbon Chemical Corp., Plastics Div., New, York, N. Y.
Virkotype	Raised printing compounds	Wood, Nathan & Virkus Co., Inc., Racine, Wis.
Visco	Filling machine for viscous materials	Karl Kiefer Machine Co., Cincinnati, O.
Visinet	Open-mesh bags	Bemis Bro. Bag Co., St. Louis, Mo.
Visitainer	Transparent container	Old Dominion Box Co., Charlotte, N. C.
Viswrap	Cellophane and paper window wrapper	The Dobeckmun Co., Cleveland, O.
Visualite	Window and transparent bags	Paramount Paper Products Co., Inc., Phila., Pa.
Vivo-Lith Vignettes	Direct color photographic reproduction for labels, seed packets, etc.	Stecher-Traung Lithograph Corp., Rochester, N. Y.
Vol-U-Meter	Semi-automatic drum filling valve	The Vol-U-Meter Co., Buffalo, N. Y.
Vortex Cups	Paper drinking cups and containers	Dixie-Vortex Co., Easton, Pa.
Vue Lite	Translucent plastic sheets	Monsanto Chemical Co., Plastics Div., Springfield, Mass.
Vue-Pac	Cellophane window display cartons	Gordon-Lavin Paper Box Co., Inc., Baltimore, Md.
Vuepak	Rigid transparent materials	Monsanto Chemical Co., Plastics Div., Springfield, Mass.
Vulcabeston	Synthetic rubber and asbestos	Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.
Vu-Net	Open mesh bags	The Grimes Co., Denver, Colo.
Wabecoat	Coated board	Container Corp. of America, Chicago, Ill.
Walsallo	Cellophane ribbons	The Walser Mfg. Co., Inc., Clifton, N. J.
Ware Foils	Coated box coverings	McLaurin-Jones Co., Brookfield, Mass.
Waregold-Ware	Gold and platinum box coverings	McLaurin-Jones Co., Brookfield, Mass.
Warelac	Coated box coverings	McLaurin-Jones Co., Brookfield, Mass.
Wareplatinum	Platinum box covering	McLaurin-Jones Co., Brookfield, Mass.
Ware Super Colors	Coated box coverings	McLaurin-Jones Co., Brookfield, Mass.
Warnercraft	Set-up and folding boxes	The Warner Bros. Co., Bridgeport, Conn.
Warp-Proof	Glue	The F. G. Findley Co., Milwaukee, Wis.
Washington Brilliant	Box covers	District of Columbia Paper Mills, Inc., Washington, D. C.
Water-Tite	Waterproof paper	Rexford Paper Co., Milwaukee, Wis.
Wax-Pax	Sandwich bags in packages and bulk	The American Paper Goods Co., Kensington, Conn.
Waxsheen	Highly transparent and glossy cake and candy wrapper	Dixie Wax Paper Co., Inc., Dallas, Texas
Weavette	Box paper	Kupfer Bros. Co., New York, N. Y.
Weigh-Flow	Vibrating weighing feeders	Syntron Co., Homer City, Pa.
Weighmaster	Automatic conveyor scale	Merrick Scale Mfg. Co., Passaic, N. J.
Wekilite	Coated and foil box papers	Hazen Paper Co., Holyoke, Mass.
Wethy	Ribbons	W-E-R Ribbon Corp., New York, N. Y.
Wexco	Capper	Scientific Filter Co., New York, N. Y.
Whalehide	Crate liners	Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Whirlwind	Electric label paster and screw capper	Scientific Filter Co., New York, N. Y.
Whitehall	Dispensers	Food Dispenser Co., Hartford, Conn.
Whiz-Tape	Narrow opening tape inserted beneath transparent wrappers	Shellmar Products Co., Mt. Vernon, O.
Williams Stripe	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Wind-O-Band	Cellulose bands	Armstrong Cork Co., Lancaster, Pa.
Wind-O-Band	Cellulose seal	E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.
Windocel	Cellophane window cartons	Brooks & Porter, Inc., New York, N. Y.
Windorap	Combination transparent and opaque wrappers	Newark Paraffine & Parchment Paper Co., Newark, N. J.
Windoseals	Milk bottle hoods	Reynolds Metals Co., Richmond, Va.
Winnerwite	Box cover paper	Matthias Paper Corp., Phila., Pa.
Wireless	Folded oyster and food pail	Bloomer Bros. Co., Newark, New York State
Wirestrap	Round wire strap	Acme Steel Co., Chicago, Ill.
Wizard	Marking compound	Markem Machine Co., Keene, N. H.
Wizard Iceproof	Glue for labeling bottles	Midland Glue Products Co., Detroit, Mich.
Wiz-Wite	Paper, for box wraps and printing	Matthias Paper Corp., Phila., Pa.
Wonder	Printing inks, lithographic supplies	International Printing Ink, Div. Interchemical Corp., New York, N. Y.
Wonder	Paper box guns	Stein, Hall Mfg. Co., Chicago, Ill.
Wonpreshun	Printing ink	Sigmund Ullman Co., Div. General Printing Ink Corp., Bronx, N. Y.
Woodcraft	Imitation wood paper	The Marvellum Co., Holyoke, Mass.
Woodcraft	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Woodette	Box paper	Kupfer Bros. Co., New York, N. Y.
Worlbeater	Hand mixer	Na-Mac Products Corp., Los Angeles, Calif.
World	Automatic and semi-automatic labelers	Economic Machinery Co., Worcester, Mass.
World's Fair	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Wotta Blacks	Letterpress inks	E. J. Kelly Co., Kalamazoo, Mich.
Wrap-Ade	Bag making machinery and crimpers	Wrap-Ade Machine Co., Inc., Newark, N. J.
Wrap-O-Matic	Wrapping machines	Lynch Mfg. Corp., Defiance, O.
Wright	Paper drills and punches	Harris-Seybold-Potter Co., Dayton, O.
"X" Base	Inks for raised printing	Wood, Nathan & Virkus Co., Inc., Racine, Wis.
X-Flex	Synthetic resin cement	Paisley Products, Inc., Chicago, Ill.
Yankee Nests	Nest of lock corner wooden boxes	New England Box Co., Greenfield, Mass.
Yuletide	Box paper	Kupfer Bros. Co., New York, N. Y.
Zapon	Industrial finishes	Atlas Powder Co., Zapon Div., Stamford, Conn., & N. Chicago, Ill.
Zaponite	Wood finishes	Atlas Powder Co., Zapon Div., Stamford, Conn., & N. Chicago, Ill.
Zephyr	Carton gluer	E. G. Staude Mfg. Co., St. Paul, Minn.
Zephyr	Tubing for loaves	The Visking Corp., Chicago, Ill.
Zero-Seal	Waxed paper	The Menasha Products Co., Div. Marathon Paper Mills Co., Menasha, Wis.
Zip-Strip Seals	Tamper-proof aluminum closures	Guardian Safety Seal Co., Chicago, Ill.
Zip Tape	Cellophane package opening tape	The Dobeckmun Co., Cleveland, O.
Zip-Wrap	Cellophane sheet with pull tape attached	The Dobeckmun Co., Cleveland, O.

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LIST OF MANUFACTURERS AND ADDRESSES

A

Ability Mold & Die Works, 1237 N. California, Chicago, Ill.
Able Machine & Tool Works, 20 W. 22nd St., New York, N. Y.
Accessories Mfg. Co., 127 E. 31st St., Kansas City, Mo.
Accurate Molding Corp., 116–132 Nassau St., Bklyn, N. Y.
Ace Carton Corp., 5800 W. 51st St., Chicago 38, Ill.
Ackerman Plastic Molding, 986 E. 200th St., Cleveland, Ohio
Acme Burlap Bag Co., 42 Emerson Place, Bklyn, N. Y.
Acme Folding Box Co., 200 Lynch St., St. Louis, Mo.
Acme Paper Box Co., 5950 S. State St., Chicago, Ill.
Acme Printing Ink Co., 1315 W. Congress St., Chicago, Ill.
Acme Staple Co., 1643 Haddon Ave., Camden, N. J.
Acme Steel Co., 2834 Archer Ave., Chicago 8, Ill.
Acraglas Co., The, 1805 14th St., Santa Monica, Calif.
Adams Paper Co., Wells River, Vt.
Addison Lithographing Co., 245 Hollenbeck St., Rochester, N. Y.
Adler, H. M. & Co., 305 S. Sharp St., Baltimore, Md.
Adler Engineering Co., 295 Main St., Hackettstown, N. J.
Advance Molding Corp., 54 W. 21st St., New York, N. Y.
Advanced Closures Corp., 46th & First Aves., Bklyn, N. Y.
Advertising Metal Display Co., 822 W. Washington Blvd., Chicago 7, Ill.
Aeroil Burner Co., Inc., Park Ave., at 57th St., West New York, N. J.
Aids, Inc., 1220 Broadway, New York, N. Y.
Ajax Bottle Cap Corp., 1226 Flushing Ave., Bklyn, N. Y.
Albert Paper Box Co., Inc., 360 Furman St., Bklyn, N. Y.
Albia Box & Paper Co., Troy, N. Y.
Alden Products Co., 117 N. Main St., Brockton, Mass.
Alderman Paper Box Corp., 31 Exchange St., Rochester, N. Y.
Aldine Paper Co., 373 Fourth Ave., New York, N. Y.
Aldrich Pump Co., The, 12 Pine St., Allentown, Pa.
Alexander, Jerome, 50 E. 41st St., New York 17, N. Y.
All American Aircraft Products, Inc., 1350 E. Anaheim, Long Beach, Calif.
Allen, Arthur S., 527 Fifth Ave., New York, N. Y.
Allied Barrel Corp., North Seneca St., Oil City, Pa.
Allied Plastics Co., 8225 Wilshire Blvd., Los Angeles, Calif.
Allis-Chalmers Mfg. Co., 1126 S. 70th St., Milwaukee, Wis.
Allvue Container, Inc., 169 Franklin Ave., Bklyn, N. Y.
Alsop Engineering Corp., Mildale, Conn.
Alton Box Board Co., Alton, Ill.
Aluminum Co. of America, 801 Gulf Bldg., Pittsburgh 19, Pa.
Aluminum Container Corp., Fulton, N. Y.
Aluminum Goods Mfg. Co., Manitowoc, Wis.
Aluminum Seal Co., New Kensington, Pa.
Alvey-Ferguson Co., The, 40 Disney St., Oakley, Cincinnati, Ohio.
Amdeco, 122 Fifth Ave., New York, N. Y.
American Aluminum Ware Co., 368–378 Jelliff Ave., Newark, N. J.
American Box Board Co., 470 Market St., S. W., Grand Rapids, Mich.
American Can Co., 230 Park Ave., New York, N. Y.
American Coating Mills, Inc., Division Square, Elkhart, Ind.
American Colortype Co., 1151 West Roscoe St., Chicago, Ill.
American Cyanamid Co., Plastics Division, 30 Rockefeller Plaza, New York, N. Y.
American Decalcomania Co., 4326–38 Fifth Ave., Chicago, Ill.
American Denture Corp., 536 S. E. 6th Ave., Portland, Ore.
American Excelsior Corp., 1000 N. Halsted St., Chicago 22, Ill.
American Folding Box Co., 1901 Washington Ave., St. Louis, Mo.
American Hard Rubber Co., 11 Mercer St., New York, N. Y.
American Insulator Corp., New Freedom, Pa.
American Label Cutting Co., 230 W. 17th St., New York, N. Y.
American Lace Paper Co., 4425 N. Port Washington Ave., Milwaukee, Wis.
American Molded Products Co., 1753 No. Honore St., Chicago, Ill.
American Molding Co., 355 Fremont St., San Francisco 5, Calif.
American National Bag & Burlap Co., Inc., 343 Kent Ave., Bklyn 11, N. Y.
American Package Co., 402 Lafayette St., New York, N. Y.
American Paper Bottle Co., 1813 Collingwood Blvd., Toledo, Ohio.
American Paper Goods Co., The, 449 Main St., Kensington, Conn.
American Perforator Co., The, 625 W. Jackson Blvd., Chicago, Ill.
American Phenolic Corp., 1830 So. 54th Ave., Cicero P. O., Chicago, Ill.
American Plastics Corp., 225 W. 34th St., New York, N. Y.
American Printing Ink Co., Div. General Printing Ink Corp., 2314 W. Kinzie St., Chicago, Ill.
American Products Mfg. Co., 8131 Oleander St., New Orleans, La.
American Sealcone Corp., 1911 Park Ave., New York, N. Y.
American Seal-Kap Corp., 11-05 44th Drive, Long Island City, N. Y.
American Star Cork Co., Inc., 175–177 N. 9th St., Bklyn 11, N. Y.
American Tissue Mills, 12 Crescent St., Holyoke, Mass.
American Tri-State Paper Box Co., 808 17th Ave., N. Nashville, Tenn.
Ames Bag Co., Selma, Ala.
Ames Harris Neville Co., 2800 17th St., San Francisco, Calif.
Amos-Thompson Corp., Edinburgh, Ind.
Ams-Max Machine Co., The, Scofield Ave., Bridgeport, Conn.
Amsco Packaging Machinery, Inc., 31–31 48th Ave., Long Island City, N. Y.
Analytical Laboratory, The, 921 Bergen Ave., Jersey City, N. J.
Anchor Hocking Glass Corp., 20 Glass Ave., Lancaster, Ohio.
Andersen, A. J., 429 W. Superior St., Chicago 10, Ill.
Anderson Box & Basket Co., 230 Fifth Ave., New York, N. Y.
Anderson, George W., Inc., 36th Ave. & 38th St., Long Island City 1, N. Y.
Andrews, O. B. Co., Rossville Blvd., Chattanooga, Tenn.
Andrews, P. L. Corp., 78th & Cooper Ave., Ridgewood Station, Bklyn 27, N. Y.
Angelus Paper Box Co., 751 N. Broadway, Los Angeles, Calif.
Angier Corp., Framingham, Mass.
Apex Paper Box Corp., 2318 Southwestern Ave., Chicago, Ill.
Arabol Mfg. Co., The, 110 E. 42nd St., New York 17, N. Y.
Arenco Machine Co., Inc., 25 W. 43rd St., New York 18, N. Y.
Arens-Egmont, 480 Lexington Ave., New York, N. Y.
Aridor Co., The, 3428 W. 48th Place, Chicago 32, Ill.
Aridye Corp. (subsidiary of Interchemical Corp.), Fair Lawn, N. J.
Arkell & Smiths, 1941 Mill St., Canajoharie, N. Y.
Arkell Safety Bag Co., 10 East 40th St., New York, N. Y.
Armstrong Cork Co., 910 Arch St., Lancaster, Pa.
Armstrong Paint & Varnish Works, 1330 S. Kilbourn Ave., Chicago, Ill.
Arpin Products, Inc., 422 Alden St., Orange, N. J.
Arrow Mfg. Co., Inc., 15th & Hudson Sts., Hoboken, N. J.
Arrow Plastics Corp., 178 River Drive, Passaic, N. J.
Art Tube Co., Inc., 500 Lyons Ave., Irvington 11, N. J.
Artcote Papers, Inc., 390 Colt St., Irvington 11, N. J.
Artisan Plastic Molding Co., 40 Belvidere St., Trenton, N. J.
Artistic Flower Co., 24 E. 21st St., New York, N. Y.
Arvey Corp., 300 Communipaw Ave., Jersey City 4, N. J.
Arvey Corp., 3462 N. Kimball Ave., Chicago 18, Ill.
Arwood Can Co., Knoxville, Tenn.
Ashtabula Corrugated Box Co., The, 3714 Ann Ave., Ashtabula, Ohio.
Ashuelot Paper Co., Hinsdale, N. H.
Athol Paper Box Co., 349 Main St., Athol, Mass.
Atlanta Box Factory, Inc., 237–9 Whitehall, Atlanta, Ga.
Atlanta Paper Co., 225 Moore St., Atlanta, Ga.
Atlantic Carton Corp., N. Main & 2nd Sts., Norwich, Conn.
Atlantic Excelsior Co., Inc., 11th Ave. & 29th St., New York, N. Y.
Atlantic Gummed Paper Corp., 1 Main St., Bklyn, N. Y.
Atlantic Paper Box Co., 46 Waltham St., Boston, Mass.
Atlantic Paper Box Corp., The, 139 Franklin St., Jersey City, N. J.
Atlantic Plastic & Metal Parts Co., 2730 Grand Ave., Cleveland, Ohio
Atlantic Plastics, Inc., 33-18 57th St., Woodside, N. Y.
Atlas Appliance Corp., 20 Grand Ave., Bklyn, N. Y.
Atlas-Boxmakers Inc., 2555 W. Diversey Ave., Chicago 47, Ill.
Atlas Gum & Sizing Co., Inc., 406 Pearl St., New York 7, N. Y.
Atlas Plastic Mfg. Co., Inc., 47 Broadway, Lynbrook, L. I., N. Y.
Atlas Powder Co., Zapon Div., N. Chicago, Ill.
Atlas Powder Co., Zapon Div., Stamford, Conn.
Attleboro Printing & Embossing Co., Inc., 54 Union St., Attleboro, Mass.
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Augusta Bag & Burlap Co., 514 Reynolds St., Augusta, Ga.
Auld-Hampton, Inc., 104 Verona Ave., Newark, N. J.
Ault & Wiborg, Div. of Interchemical Corp., 350 Fifth Ave., New York 1, N. Y.
Autokraft Box Corp., Plant No. 2, Maple Ave., Hanover, Pa.
Automatic Paper Box Corp., 1011–25 S. California Ave., Chicago, Ill.
Automatic Plastic Products, 1368 Park Ave., Emeryville, Calif.
Automatic Scale Co., Inc., 591 Hudson St., New York, N. Y.
Ayers, John W. & Son, Bloomfield, N. J.

B

Babcock, A. H. Co., The, 43 S. Main St., Attleboro, Mass.
Babcock Box Co., Attleboro, Mass.
Bachmann Bros., Inc., 1420 East Erie Ave., Phila., Pa.
Bader Bros. Bag Co., 1339 Clinton St., Detroit, Mich.
Badger Carton Co., 225 W. Capitol Drive, Milwaukee, Wis.
Badger Merchandising Displays, Inc., 225 W. Capitol Drive, Milwaukee, Wis.
Baermann, Walter, 208 Race St., Holyoke, Mass.
Bagpak, Inc., 220 E. 42nd St., New York 17, N. Y.
Bakelite Corp., 30 E. 42nd St., New York 17, N. Y.
Baker, Willoughby, 2921 Chapman St., Oakland, Calif.
Baker Oil Tools, Inc., P. O. Box. 127, Vernon Station, Los Angeles, Calif.
Baldwin, Eli & Son, Inc., 356 W. 18th St., New York, N. Y.
Ball Bros. Co., Muncie, Ind.
Bangor Box Co., P. O. Box 4, Bangor, Me.
Bannon Bag Co., Inc., The, 820 Magazine St., New Orleans, La.
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Baroco Oil Co., P. O. Box 2009, Tulsa, Okla.
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Bartlett Label Co., 2135 Portage St., Kalamazoo, Mich.
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Beggs & Graham, 204 Chancellor, Phila., Pa.
Belleville Can Co., Belleville, N. J.
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Bemis Bro. Bag Co., 408 Pine St., St. Louis 2, Mo.
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Blum, Emery & Co., Inc., 251 Fifth Ave., New York, N. Y.
Blum Folding Paper Box Co., Inc., 79 Bogart St., Bklyn, N. Y.
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Bolta Co., The, 151 Canal St., Lawrence, Mass.
Bond Mfg. Corp., Inc., 16th & Locust Sts., Wilmington, Del.
Bones & Mayer, 3915 Powelton Ave., Phila., Pa.
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Bostitch, Inc., 48 Division St., East Greenwich, R. I.
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Bridgeport Moulded Products, Inc., 300 Myrtle Ave., Bridgeport, Conn.
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Brooks Paper Co., Security Bldg., St. Louis, Mo.
Brown & Brown, 56 Congress St., Mobile, Ala.
Brown Bag Filling Machine Co., The, 10 Main St., Fitchburg, Mass.
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Brown Co., 404 Commercial, Portland, Me.
Bryant Electric Co., Bridgeport, Conn.
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Buedingen, William & Sons, 1500 Clinton Ave., New Rochester, N. Y.
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Bulkley, Dunton & Co., 295 Madison Ave., New York, N. Y.
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Burt, F. N. Co., Inc., 514 Seneca St., Buffalo, N. Y.
Burt Machine Co., 401–3 East Oliver St., Baltimore, Md.
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Butterfield-Barry Co., 174–178 Hudson St., New York, N. Y.
Button Corp. of America, 40 Dickerson St., Newark, N. J.

C

Cadillac Can Co., Mary St., Mt. Clemens, Mich.
Caldwell Products, Inc., 142 W. 24th St., New York, N. Y.
California Ink Co., Inc., The, 545 Sansome St., San Francisco, Calif.
California Pacific Plastic Co., 2225 Sunset Blvd., Los Angeles, Calif.
California Plastic Moulding Co., 1702 E. 61st St., Los Angeles, Calif.
California Plastics Co., 580 Market St., San Francisco, Calif.
California Testing Laboratories, Inc., 1429 Santa Fe Ave., Los Angeles, Calif.
Calumet Carton Co., Harvey, Ill.
Calvert Lithographing Co., 2100 Grand River Ave., Detroit 1, Mich.
Cambridge Instrument Co., Inc., 3732 Grand Central Terminal, New York, N. Y.
Cambridge Paper Box Co., 196 Broadway, Cambridge, Mass.
Cameo Die and Label Co., 154 W. 14th St., New York 11, N. Y.
Cameron Machine Co., 61 Poplar St., Bklyn 2, N. Y.
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Cans, Inc., 3217 W. 47th Place, Chicago, Ill.
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Capitol Paper Box Co., Inc., 1300 6th St., N. Bergen, N. J.
Capitol Printing Ink Co., Inc., 406 Channing St., N. E., Washington, D. C.
Carbide & Carbon Chemical Corp., 30 E. 42nd St., New York 17, N. Y.
Cardinal Corp., The, Evansville, Ind.
Carlson Autopress Corp., Rockledge, Pa.
Carlson, John P., Inc., 420 Carroll St., Bklyn, N. Y.
Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
Carolina Paper Box Corp., Ft. of Gardner Ave., Charlotte, N. C.
Carpenter Container Corp., 137–147 41st St., Bklyn 32, N. Y.
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Carter, Joseph, 6 N. Michigan Ave., Chicago, Ill.
Carter, William Co., Highland Ave., Needham Heights, Mass.
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Carton Service, Inc., Franklin Ave., Shelby, Ohio
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Central Bag & Burlap Co., 4513 S. Western Blvd., Chicago, Ill.
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Central Can Co., Inc., 1104–1110 Santa Fe, Kansas City 7, Mo.
Central Carton Co., 1901 Gest St., Cincinnati, Ohio
Central Die Casting & Mfg. Co., 2935 W. 47th St., Chicago, Ill.
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Central Lithograph Co., The, 113 St. Clair Ave., N. E., Cleveland, Ohio.
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Central Paper Box Co., 2911–43 Belleview Ave., Kansas City, Mo.
Central Paper Co., Manitowoc St., Menasha, Wis.
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Central Process Corp., 1401 S. Circle Ave., Forest Park, Ill.
Central States Paper & Bag Co., 2600 N. Broadway, St. Louis 6, Mo.
Central Waxed Paper Co., 5659 W. Taylor St., Chicago, Ill.
Century Ribbon Mills, 80 Madison Ave., New York, N. Y.
Chain Belt Co., 1600 W. Bruce St., Milwaukee, Wis.
Champion Paper & Fibre Co., The, Hamilton, Ohio
Champlain Div., The Fred. Goat Co., Inc., 636 11th Ave., New York 19, N. Y.
Chase, H. & L., 267 Atlantic Ave., Boston, Mass.
Chase Bag Co., 155 E. 44th St., New York, N. Y.
Chasen, Alex & Co., Columbia Ave. & Randolph St., Phila., Pa.
Chaspec Mfg. Co., 295 Lafayette St., New York 12, N. Y.
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Chemical Color & Supply Co., Div. General Printing Ink Corp., 547 S. Clark St., Chicago, Ill.
Chemical Paper Mfg. Co., Jackson St., Holyoke, Mass.
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Cheron, Pierre J., 65 Locust St., Stratford, Conn.
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Chesapeake Paper Board Co., The, Baltimore, Md.
Chicago Carton Co., 4200 S. Crawford Ave., Chicago, Ill.
Chicago Die Mold Mfg. Co., 1735 Diversey Pkwy., Chicago, Ill.
Chicago Gum Tape Co., 855 W. Adams St., Chicago Ill.
Chicago Label & Box Co., 312 N. May St., Chicago, Ill.
Chicago Molded Products Corp., 1020 N. Kolmar Ave., Chicago 51, Ill.
Chicago Plastic Mfg. Co., 4029 W. Kinzie St., Chicago, Ill.
Chicago Printed String Co., 2320 Logan Blvd., Chicago, Ill.
Chipman, Richmond Lane, Jr., 1 Brunswick Rd., Montclair, N. J.
Chirpe, W. Rodney, 185 N. Wabash Ave., Chicago, Ill.
Cinch Mfg. Corp., 2335 W. VanBuren St., Chicago, Ill.
Cincinnati Advertising Products Co., 3274 Beekman St., Cincinnati, Ohio
Cincinnati Industries, Inc., Lockland (Cincinnati), Ohio
Cincinnati Molding Co., 2037 Florence Ave., Cincinnati 6, Ohio
Cin-Made Corp., The, 801 E. 3rd St., Cincinnati, Ohio
Claff, M. B. & Sons, Inc., 31 West St., Randolph, Mass.
Claremould Plastics Co., 135–37–39 Jackson St., Newark, N. J.
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Clark, J. L. Mfg. Co., Rockford, Ill.
Clark Box Co., The, 436 Main St., Danbury, Conn.
Clark Stek-O Corp., 1631 Dewey Ave., Rochester 13, N. Y.
Clarke Can Co., 12th & Fitzwater St., Phila., Pa.
Clarke, Rene, 247 Park Ave., New York, N. Y.
Cleveland Cartons, Div. of Robert Gair Co., Inc., 10610 Berea Rd., Cleveland, Ohio
Cleveland Container Co., The, 10530 Berea Rd., Cleveland, Ohio
Cleveland Crimping Press, Div. Cleveland Lathe & Machine Co., 5511 Euclid Ave., Cleveland 3, Ohio
Cleveland Plastics, Inc., 1611 E. 21st St., Cleveland, Ohio
Clifton Paper Board Co., Clifton, N. J.
Climax Mfg. & Molding Corp., 315 Reynolds Place, S. W., Canton, Ohio
Cloverleaf Paint & Varnish Corp., 43-43 Vernon Blvd., Long Island City, N. Y.
Clover Paper & Transparent Boxes, Inc., 816–826 E. 140th St., New York, N. Y.
Collura, Francesco, 1 E. 53rd St., New York, N. Y.
Coloroid Co., Inc., 6919 Lorraine Ave., Cleveland, Ohio
Colton, Arthur Co., 2600 E. Jefferson Ave., Detroit, Mich.
Colt's Patent Fire Arms Mfg. Co., 17 Van Dyke Ave., Hartford, Conn.
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Columbia Paper Box Co., 228 1st, N. W., Washington, D. C.
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Columbia Specialty Co., Inc., 6301 Eastern Ave., Baltimore, Md.
Columbus Coated Fabrics Corp., 1280 North Grant Ave., Columbus 16, Ohio
Columbus Laboratories, The, 31 N. State St., Chicago, Ill.
Columbus Paper Box Co., Inc., 344 W. Town St., Columbus, Ohio
Columbus Plastic Products, Inc., 519 Dublin Ave., Columbus 15, Ohio
Colwell, Laurence J., 305 E. 63rd St., New York, N. Y.
Comet Envelope & Paper Co., Inc., 5 E. 17th St., New York, N. Y.
Commercial Paste Co., The, 504–520 Buttles Ave., Columbus, Ohio
Commonwealth Plastic Co., 140 Adams St., Leominster, Mass.
Compo-Site Plastic Division, Lowe, E. S. Co., Inc., 85 5th Ave., Paterson 4, N. J.
Compressed Paper Box Corp., 128 Thompson St., Bridgeport, Conn.
Condon, Frank, 25 Broadway, New York, N. Y.
Conneaut Can Co., Inc., The, Whitney Road, Conneaut, Ohio
Connecticut Hard Rubber Co., 407 East St., New Haven, Conn.
Connecticut Plastic Products Co., 124 N. Elm St., Waterbury, Conn.
Consolidated Box Co., Inc., 3302 N. Armenia Ave., P. O. Box 4341, Tampa, Fla.
Consolidated Fruit Jar Co., New Brunswick, N. J.
Consolidated Lithographing Corp., 1013 Grand St., Bklyn, N. Y.
Consolidated Molded Plastics Corp., Scranton, Pa.
Consolidated Packaging Machinery Co., 1400 West Ave., Buffalo 13, N. Y.
Consolidated Paper Co., E. First St., Monroe, Mich.
Consolidated Paper & Box Mfg. Co., 413 E. Canal St., Richmond, Va.
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Consolidated Paper Box Co., 6 Vernon St., Somerville, Mass.
Consolidated Water & Power Co., Wisconsin Rapids, Wis.
Container Company, The, 975 Glenn St., Van Wert, Ohio

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Container Corporation of America, 111 W. Washington St., Chicago 2, Ill.
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Continental Bag Specialty Corp., 601 W. 26th St., New York, N. Y.
Continental Can Co., 100 E. 42nd St., New York 17, N. Y.
Continental Container Corp. (See Scandore Paper Box Co.)
Continental Folding Paper Box Co., Inc., Richfield, N. J.
Continental Lithograph Corp., 952 E. 72nd St., Cleveland, Ohio
Continental Paper Co., Richfield Park, N. J.
Continental Paper Products Co., Box 4116, South Denver Station, Denver 9, Colo.
Continental Plastics Corp., 314 W. Erie St., Chicago, Ill.
Cooper, R. G., 7376 Grand River Ave., Detroit, Mich.
Cordiano Can Co., Inc., 20 Grand Ave., Bklyn, N. Y.
Corn Products Refining Co., 17 Battery Place, New York, N. Y.
Cornell Wood Products Co., 230 N. Michigan Ave., Chicago, Ill.
Corning Glass Works, Corning, N. Y.
Cottonluxe Mfg Co., 597 E. 137th St., New York 54, N. Y.
Cottrell, C. B. & Sons, Co., Claybourn Div., 3713 N. Humboldt Ave., Milwaukee 1, Wis.
Coughlin Mfg. Co., 697–701 E. 132nd St., New York, N. Y.
Cournand, E. L. Inc., 285 Madison Ave., N. Y.
Cowles, H. A. Box & Display Co., 163 St. Paul St., Rochester, N. Y.
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Craftsman Label Co., 120 W. 20th St., New York, N. Y.
Craven-Whittaker Co., 215 Georgia Ave., Providence, R. I.
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Crescent Box Corporation, 621 E. Erie St., Phila., Pa.
Crescent Burlap Bag Co., 4124 Toulouse St., New Orleans 6, La.
Crescent Ink & Color Co. of Pa., 464 N. 5th St., Phila. 23, Pa.
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Croce, Isabel M., 137 E. 38th St., New York, N. Y.
Crocker Union, 735 Harrison St., San Francisco, Calif.
Crompton-Aldelphia, John Corp., 145 W. Columbia Ave., Phila., Pa.
Cromwell Paper Co., The, 4801 S. Whipple St., Chicago, Ill.
Crook Paper Box Co., 110–120 E. 10th Ave., N. Kansas City, Mo.
Cross Paper Products Corp., 2595 3rd Ave., New York, N. Y.
Crowell Corp., The, Yorklyn, Del.
Crown Can Co., Erie Ave., Phila., Pa.
Crown Cork & Seal Co., Eastern Ave. & Kresson St., Baltimore, Md.
Crown-Willamette Paper Co., 343 Sansome St., San Francisco, Calif.
Crown Zellerbach Corp., 343 Sansome St., San Francisco, Calif.
Crunden, Martin Mfg. Co., 2nd & Gratiot St., St. Louis, Mo.
Cruver Mfg. Co., 2456–60 Jackson Blvd., Chicago, Ill.
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Crystal Bag Co., Chickamauga, Ga.
Crystal Tissue Co., Middletown, Ohio
Crystal Transparent Corp., 136 W. 21st St., New York 11, N. Y.
Crystal Tube Corp., 538 S. Wells St., Chicago, Ill.
Cupples Co., 7th & Spruce Sts., St. Louis, Mo.
Cupples-Hess Corp., 4175 N. Kingshighway, St. Louis 15, Mo.
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D

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Danbury Square Box Co., The, P. O. Box 729, Danbury, Conn.
Daniels Mfg. Co., Rhinelander, Wis.
Datz Mfg. Co., 537–41 N. 3rd St., Phila., Pa.
Davies Can Co., The, 872 E. 72nd St., Cleveland, Ohio
Davies, Harry Molding Co., 1428 N. Wells St., Chicago, Ill.
Davison, Geo. M., 50 E. 42nd St., New York, N. Y.
Davison Chemical Corp., The, 20 Hopkins Place, Baltimore 3, Md.
Dayton Insulating Molding Co., 207 E. 6th St., Dayton, Ohio
Decorated Containers Co., 1478 Chestnut Ave., Hillside, N. J.
Decotone Products, Div. Fitchburg Paper Co., 193 Kimball St., Fitchburg, Mass.
Deerfield Glassine Co., Monroe Bridge, Mass.
Deisroth, W. H. Co., Inc., S. E. Cor. 3rd & Cambria Sts., Phila., Pa.
Dejonge, Louis & Co., 161 6th Ave., New York, N. Y.
Delman Paper Box Co., The, 419 W. 5th St., Cincinnati, Ohio
Delta Paper Boxes, Inc., 34 Hubert St., New York, N. Y.
Denins, James Andrew, 509 5th Ave., New York 17, N. Y.
Dennison Mfg. Co., Howard St., Framingham, Mass.
Densen-Banner Co., Richfield Park, N. J.
Design Center, Inc., 531 W. 52nd St., New York, N. Y.
Designers for Industry, Inc., 2915 Detroit Ave., Cleveland 13, Ohio
Designs, Inc., 2027 83rd St., N. Bergen, N. J.
Desky, Donald, 630 5th Ave., New York, N. Y.
Detecto Scales, Inc., 1 Main St., Bklyn, N. Y.
Detroit Macoid Corp., 12345 Cloverdale Ave., Detroit, Mich.
Detroit Sulphite & Paper Co., 9125 W. Jefferson Ave., Detroit, Mich.
Detroit Testing Laboratory, The, 554 Bagley Ave., Detroit, Mich.
Dewey & Almy Chemical Co., 62 Whittemore Ave., Cambridge 40, Mass.
Dexter, C. H. & Sons, Inc., 100 Canal, Windsor Locks, Conn.
Dexter Folder Co., 330 W. 42nd St., New York, N. Y.
Diagraph-Bradley Stencil Machine Corp., 3755 Forest Park Blvd., St. Louis, Mo.
Diamond Paper Box Co., Somerton St., 741 Park Ave., Rochester, N. Y.
Diamond Paper Mills Co., Inc., 205 E. 42nd St., New York, N. Y.
Dickerman Box Co., 36 Landsdowne St., Cambridge, Mass.
Diemolding Corp., Rasbach St., Canastota, N. Y.
Dillon-Beck Mfg. Co., 103 Montgomery Ave., Irvington, N. J.
Dimco Plastics, 207 E. 6th St., Dayton 1, Ohio
Disbrow Mfg. Co., 16–34 Nesbit St., Newark, N. J.
Dispersions Process, Inc., 1230 6th Ave., New York 20, N. Y.
Display Finishing Co., Inc., 21-16 44th Rd., Long Island City, N. Y.
Displayers, The, 167 W. 64th St., New York, N. Y.
District of Columbia Paper Mills, Inc., Potomac & K Sts., N. W., Washington, D. C.
Ditch, Ruth M., 813 Mart Bldg., St. Louis, Mo.
Dix, J. J. Inc., 829 E. 134th St., New York, N. Y.
Dixie Cup Co., 24th & Dixie Ave., Easton, Pa.
Dixie Wax Paper Co., Inc., 1300 S. Polk St., P. O. Box 5116, Dallas, Texas
Dobeckmun Co., The, 3301 Monroe Ave., Cleveland 9, Ohio.
Dodge Cork Co., Inc., Lancaster, Pa.
Dodge, E. F., Paper Box Co., 124 Central St., Leominster, Mass.
Dohner & Lippincott, 500 5th Ave., New York, N. Y.
Dorfman, A. Co., Inc., 59 W. 19th St., New York, N. Y.
Double Duty Products, Inc., 6919 Lorain Ave., Cleveland 2, Ohio
Dow Chemical Co., The, Midland, Mich.
Dowd, M. S. Carton Co., 162 Barbour St., Hartford, Conn.
Drell Novelty Mfg. Co., The, 519 8th Ave., New York 18, N. Y.
Driggs Paper Products Corp., 305 Boerum St., Bklyn, N. Y.
Driscoll, Martin & Co., 610 Federal St., Chicago, Ill.
Dumas Laboratory, The, 407 Five Ivy St., Atlanta, Ga.
Dunn, Thomas, W. Co., 546 Greenwich St., New York, N. Y.
Dunn Sulphite Paper Co., 218 Riverview, Port Huron, Mich.
du Pont de Nemours, E. I. & Co., Inc., 10th & Market Sts., Wilmington 98, Del.
Durez Plastics & Chemicals, Inc., 1943 Walck Rd., N. Tonawanda, N. Y.
Durite Plastics, Inc., 5000 Summerdale Ave., Phila., Pa.
Du-Tone Ribbon Corp., 511 E. 72nd St., New York, N. Y.

E

Eagle Can Co., 356 Mystic Ave., Somerville, Mass.
Eagle Paper Box Co., 1826 6th St., Detroit, Mich.
Eagle Paper Box Co., 720 E. 11th St., New York, N. Y.
Eagle Paper Box Mfg. Co., 1755 N. Monitor Ave., Chicago, Ill.
Eagle Plastics Corp., 23-10 Bridge Plaza S., Long Island City, N. Y.
Eagle Printing Ink Co., Div. General Printing Ink Corp., 100 6th Ave., New York, N. Y.
Earl, M. J. Co., Inc., Reading, Pa.
Earlville Paper Box Co., Earlville, N. Y.
Eastern Can Co., Inc., 649 Kent Ave., Bklyn, N. Y.
Eastern Cap & Closure Corp., Baltimore, Md.
Eastern Plastics Products Corp., 1007 McCartney St., Pittsburgh 20, Pa.
Eastern States Cartons, Div. of Robert Gair Co., Inc., 75 Front St., Bklyn, N. Y.
Eastman Kodak Co., Rochester 4, N. Y.
Eby, Hugh H. Inc., 4700 Stenton Ave., Phila., Pa.
Eclipse Moulded Products Co., 5151 N. 32nd St., Milwaukee 9, Wis.
Economic Machinery Co., Freemont, Worcester, Mass.
Economy Box & Pie Plate Co., Marion, Ind.
Economy Fuse & Manufacturing Co., 2717 N. Greenview Ave., Chicago, Ill.
Economy Novelty & Printing Co., 225 W. 39th St., New York, N. Y.
Eddy Paper Corp., The, 919 N. Michigan Ave., Chicago, Ill.; Three Rivers, Mich.; Manitowoc, Wis.; Milwaukee, Wis.; Cedar Rapids, Iowa; Detroit, Mich.
Eden Paper Co., Lancaster, Pa.
Edwards & Deutsch Lithographing Co., 2320–40 S. Wabash Ave., Chicago, Ill.
Eggers-O'Flying Co., 15th & Leavenworth, Omaha 2, Neb.
Egyptian Lacquer Mfg. Co., The, 1270 6th Ave., New York 20, N. Y.
Ehlbert Products, 844 W. Adams St., Chicago, Ill.
Einson-Freeman Co., Inc., Staff & Borden Aves., Long Island City, N. Y.
Electric Auto-Lite Co., Bay Mfg. Div., Morton St., Bay City, Mich.
Electric City Box Co., Buffalo, N. Y.
Ellis, Geo. D. & Sons, Inc., 309 N. 3rd St., Phila. 6, Pa.
Emeloid Co., Inc., 287 Laurel Ave., Arlington, N. J.
Empire Box Corp., 70 Outwater Lane, Garfield, N. J.
Empire Box Corp., 919 N. Michigan Ave., Chicago, Ill.
Empire Can Corp., 228 Ashford St., Bklyn, N. Y.
Empire Lithographing Co., Inc., 333 Hudson St., New York, N. Y.
Empire Metal Cap Co., Inc., 32 33rd St., Bklyn, N. Y.
Enbee Transparent Specialty Co., 30 W. 39th St., New York, N. Y.
Eppy, Samuel Inc., 254 W. 31st St., New York, N. Y.
Equitable Paper Bag Co., Inc., 47-02 31st Place, Long Island City, N. Y.
Erie Corrugated Box Co., The, Erie, Pa.
Erie Plastics Co., 1304 Cranberry St., P. O. Box 515, Erie, Pa.
Erie Resistor Corp., 640 W. 12th St., Erie, Pa.
Ermold, Edward Co., 13th, Hudson & Gansevoort Sts., New York, N. Y.
Ertel Engineering Corp., 40 Mill St., Kingston N. Y.
Erving Paper Mills, Erving, Mass.
Erwin Bag Co., Houston, Texas
Essex Corp., Harris St., Charlottesville, Va.
Estes, E. B. & Sons, Inc., 155 E. 44th St., New York, N. Y.
Eureka Button Co., 892 Broadway, New York, N. Y.
Eureka Mfg. Co., Inc., 144 W. Britannia St., Taunton, Mass.
Eureka Paper Box Co., 401–435 E. Canal St., Williamsport 6, Pa.
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Eureka Specialty Printing Co., 530 Electric St., Scranton, Pa.
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Everett Transparent Container Co., 251 Third Ave., New York, N. Y.
Everett, Young Co., 121 Dyer St., Providence, R. I.
Exact Weight Scale Co., The, 944 W. 5th Ave., Columbus, Ohio
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit, Mich.
Excelsior Paper Specialty Co., Inc., 640 W. 57th St., New York, N. Y.

F

Fabart Instrument Co., 4740 N. Clark St., Chicago, Ill.
Fairchild, E. E. Corp., 367 Orchard St., Rochester, N. Y.
Fales Chemical Co., Inc., The, Cornwall Landing, N. Y.
Farrel, Harry H., 6 N. Michigan Ave., Chicago, Ill.
Farrington Mfg. Co., Green & Amory Sts., Boston 30, Mass.
Federal Carton Corp., 638 W. 57th St., New York, N. Y.
Federal Container Co., 56th St. & Paschall Ave., Phila., Pa.
Federal Paper Board Co., Inc., 24 River Rd., Bogota, N. J.
Federal Tin Co., Inc., 11 E. Barre St., Baltimore, Md.
Federal Tool Corp., 412 N. Leavitt St., Chicago 12, Ill.
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Fein's Tin Can Co., Inc., 50th St., & 1st Ave., Bklyn, N. Y.
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Ferguson-Lander Mfg. Co., 1733 W. Hubbard St., Chicago, Ill.
Fernstrom Paper Mills, Inc., Pomona, Calif.
Fibre Board Products, Inc., 710 Rust Bldg., San Francisco, Calif.
Fibre Cord Co., 755 E. 134th St., New York 54, N. Y.
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Birmingham Paper Co., 500 S. 21st St., Birmingham 3, Ala.
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Blake, Moffitt & Towne, 599 8th St., San Francisco 3, Calif.
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Blumenthal, Margaret, 200 Riverside Drive, New York, N. Y.
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Bolta Co., The, 151 Canal St., Lawrence, Mass.
Bond Mfg. Corp., Inc., 16th & Locust Sts., Wilmington, Del.
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Bridgeport Moulded Products, Inc., 300 Myrtle Ave., Bridgeport, Conn.
Bridgeport Paper Box Co., 304 Kossuth St., Bridgeport, Conn.
Bridgeport Testing Laboratory, Inc., 675 Knowlton St., Bridgeport, Conn.
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Brockway Glass Co., Inc., 1047 7th Ave., Brockway, Pa.
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Brooks & Porter, Inc., 304 Hudson St., New York, N. Y.
Brooks Bank Note Co., 140 Wilbraham Ave., Springfield, Mass.
Brooks Paper Co., Security Bldg., St. Louis, Mo.
Brown & Brown, 56 Congress St., Mobile, Ala.
Brown Bag Filling Machine Co., The, 10 Main St., Fitchburg, Mass.
Brown & Bailey Co., 417 N. 8th St., Phila. 23, Pa.
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Buedingen, Ferdinand Co., Inc., 240 St. Paul St., Rochester, N. Y.
Buedingen, William & Sons, 1500 Clinton Ave., New Rochester, N. Y.
Buffinton, F. H. Co., 363 Eddy St., Providence, R. I.
Bulkley, Dunton & Co., 295 Madison Ave., New York, N. Y.
Bunn, B. H. Co., 7605 Vincennes Ave., Chicago, Ill.
Burdick & Sons, Inc., 72 Hamilton St., Albany, N. Y.
Burka Bag Co. of Texas, Commerce Bldg., Galveston, Texas
Burnett, R. L. Co., 815–817 E. Commerce St., San Antonio 6, Texas
Burrows Paper Corp., Little Falls, N. Y.
Burt, F. N. Co., Inc., 514 Seneca St., Buffalo, N. Y.
Burt Machine Co., 401–3 East Oliver St., Baltimore, Md.
Burton Mfg. Co., 3855 N. Lincoln Ave., Chicago, Ill.
Buser Corp., P. O. Box 2020, Paterson, N. J.
Bushwick Can Co., Inc., 723 Henry St., Bklyn, N. Y.
Butterfield, T. F., Inc., 56 Rubber Ave., Naugatuk, Conn.
Butterfield-Barry Co., 174–178 Hudson St., New York, N. Y.
Button Corp. of America, 40 Dickerson St., Newark, N. J.

C

Cadillac Can Co., Mary St., Mt. Clemens, Mich.
Caldwell Products, Inc., 142 W. 24th St., New York, N. Y.
California Ink Co., Inc., The, 545 Sansome St., San Francisco, Calif.
California Pacific Plastic Co., 2225 Sunset Blvd., Los Angeles, Calif.
California Plastic Moulding Co., 1702 E. 61st St., Los Angeles, Calif.
California Plastics Co., 580 Market St., San Francisco, Calif.
California Testing Laboratories, Inc., 1429 Santa Fe Ave., Los Angeles, Calif.
Calumet Carton Co., Harvey, Ill.
Calvert Lithographing Co., 2100 Grand River Ave., Detroit 1, Mich.
Cambridge Instrument Co., Inc., 3732 Grand Central Terminal, New York, N. Y.
Cambridge Paper Box Co., 196 Broadway, Cambridge, Mass.
Cameo Die and Label Co., 154 W. 14th St., New York 11, N. Y.
Cameron Machine Co., 61 Poplar St., Bklyn 2, N. Y.
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Campbell Box & Tag Co., 903 S. Main St., South Bend, Ind.
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Capitol Paper Box Co., Inc., 1300 6th St., N. Bergen, N. J.
Capitol Printing Ink Co., Inc., 406 Channing St., N. E., Washington, D. C.
Carbide & Carbon Chemical Corp., 30 E. 42nd St., New York 17, N. Y.
Cardinal Corp., The, Evansville, Ind.
Carlson Autopress Corp., Rockledge, Pa.
Carlson, John P., Inc., 420 Carroll St., Bklyn, N. Y.
Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
Carolina Paper Box Corp., Ft. of Gardner Ave., Charlotte, N. C.
Carpenter Container Corp., 137–147 41st St., Bklyn 32, N. Y.
Carr-Lowrey Glass Co., P. O. Box 356, Baltimore 3, Md.
Carter, Joseph, 6 N. Michigan Ave., Chicago, Ill.
Carter, William Co., Highland Ave., Needham Heights, Mass.
Carthage Paper Makers, Inc., 1 Front St., Carthage, N. Y.
Carton Service, Inc., Franklin Ave., Shelby, Ohio
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Cavalier Cap Corp., 507 Botetourt St., Norfolk, Va.
Celanese Celluloid Corp., 180 Madison Ave., New York 16, N. Y.
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Central Bag & Burlap Co., 4513 S. Western Blvd., Chicago, Ill.
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Central Can Co., Inc., 1104–1110 Santa Fe, Kansas City 7, Mo.
Central Carton Co., 1901 Gest St., Cincinnati, Ohio
Central Die Casting & Mfg. Co., 2935 W. 47th St., Chicago, Ill.
Central Fibre Products Co., 111 W. Washington St., Chicago, Ill.
Central Lithograph Co., The, 113 St. Clair Ave., N. E., Cleveland, Ohio.
Central Machine Works Co., 1234 Central Ave., N. E., Minneapolis, Minn.
Central Paper Box Co., 2911–43 Belleview Ave., Kansas City, Mo.
Central Paper Co., Manitowoc St., Menasha, Wis.
Central Paper Corp., Muskegon, Mich.
Central Process Corp., 1401 S. Circle Ave., Forest Park, Ill.
Central States Paper & Bag Co., 2600 N. Broadway, St. Louis 6, Mo.
Central Waxed Paper Co., 5659 W. Taylor St., Chicago, Ill.
Century Ribbon Mills, 80 Madison Ave., New York, N. Y.
Chain Belt Co., 1600 W. Bruce St., Milwaukee, Wis.
Champion Paper & Fibre Co., The, Hamilton, Ohio
Champlain Div., The Fred. Goat Co., Inc., 636 11th Ave., New York 19, N. Y.
Chase, H. & L., 267 Atlantic Ave., Boston, Mass.
Chase Bag Co., 155 E. 44th St., New York, N. Y.
Chasen, Alex & Co., Columbia Ave. & Randolph St., Phila., Pa.
Chaspec Mfg. Co., 295 Lafayette St., New York 12, N. Y.
Chatfield Paper Co., 227 W. 3rd St., Cincinnati, Ohio.
Chemical Color & Supply Co., Div. General Printing Ink Corp., 547 S. Clark St., Chicago, Ill.
Chemical Paper Mfg. Co., Jackson St., Holyoke, Mass.
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Cheron, Pierre J., 65 Locust St., Stratford, Conn.
Chesapeake Can Co., Inc., Crisfield, Md.
Chesapeake Paper Board Co., The, Baltimore, Md.
Chicago Carton Co., 4200 S. Crawford Ave., Chicago, Ill.
Chicago Die Mold Mfg. Co., 1735 Diversey Pkwy., Chicago, Ill.
Chicago Gum Tape Co., 855 W. Adams St., Chicago Ill.
Chicago Label & Box Co., 312 N. May St., Chicago, Ill.
Chicago Molded Products Corp., 1020 N. Kolmar Ave., Chicago 51, Ill.
Chicago Plastic Mfg. Co., 4029 W. Kinzie St., Chicago, Ill.
Chicago Printed String Co., 2320 Logan Blvd., Chicago, Ill.
Chipman, Richmond Lane, Jr., 1 Brunswick Rd., Montclair, N. J.
Chirpe, W. Rodney, 185 N. Wabash Ave., Chicago, Ill.
Cinch Mfg. Corp., 2335 W. VanBuren St., Chicago, Ill.
Cincinnati Advertising Products Co., 3274 Beekman St., Cincinnati, Ohio
Cincinnati Industries, Inc., Lockland (Cincinnati), Ohio
Cincinnati Molding Co., 2037 Florence Ave., Cincinnati 6, Ohio
Cin-Made Corp., The, 801 E. 3rd St., Cincinnati, Ohio
Claff, M. B. & Sons, Inc., 31 West St., Randolph, Mass.
Claremould Plastics Co., 135–37–39 Jackson St., Newark, N. J.
Clark, Geo. V. Co., Inc., 42-26 13th St., Long Island City, N. Y.
Clark, J. L. Mfg. Co., Rockford, Ill.
Clark Box Co., The, 436 Main St., Danbury, Conn.
Clark Stek-O Corp., 1631 Dewey Ave., Rochester 13, N. Y.
Clarke Can Co., 12th & Fitzwater St., Phila., Pa.
Clarke, Rene, 247 Park Ave., New York, N. Y.
Cleveland Cartons, Div. of Robert Gair Co., Inc., 10610 Berea Rd., Cleveland, Ohio
Cleveland Container Co., The, 10630 Berea Rd., Cleveland, Ohio
Cleveland Crimping Press, Div. Cleveland Lathe & Machine Co., 5511 Euclid Ave., Cleveland 3, Ohio
Cleveland Plastics, Inc., 1611 E. 21st St., Cleveland, Ohio
Clifton Paper Board Co., Clifton, N. J.
Climax Mfg. & Molding Corp., 315 Reynolds Place, S. W., Canton, Ohio
Cloverleaf Paint & Varnish Corp., 43-43 Vernon Blvd., Long Island City, N. Y.
Clover Paper & Transparent Boxes, Inc., 816–826 E. 140th St., New York, N. Y.
Collura, Francesco, 1 E. 53rd St., New York, N. Y.
Coloroid Co., Inc., 6919 Lorraine Ave., Cleveland, Ohio
Colton, Arthur Co., 2600 E. Jefferson Ave., Detroit, Mich.
Colt's Patent Fire Arms Mfg. Co., 17 Van Dyke Ave., Hartford, Conn.
Columbia Box Board Mills, Inc., Chatham, N. Y.
Columbia Paper Box Co., 228 1st, N. W., Washington, D. C.
Columbia Protektosite Co., Inc., 631 Central Ave., Carlstadt, N. J.
Columbia Specialty Co., Inc., 6301 Eastern Ave., Baltimore, Md.
Columbus Coated Fabrics Corp., 1280 North Grant Ave., Columbus 16, Ohio
Columbus Laboratories, The, 31 N. State St., Chicago, Ill.
Columbus Paper Box Co., Inc., 344 W. Town St., Columbus, Ohio
Columbus Plastic Products, Inc., 519 Dublin Ave., Columbus 15, Ohio
Colwell, Laurence J., 305 E. 63rd St., New York, N. Y.
Comet Envelope & Paper Co., Inc., 5 E. 17th St., New York, N. Y.
Commercial Paste Co., The, 504–520 Buttles Ave., Columbus, Ohio
Commonwealth Plastic Co., 140 Adams St., Leominster, Mass.
Compo-Site Plastic Division, Lowe, E. S. Co., Inc., 85 5th Ave., Paterson 4, N. J.
Compressed Paper Box Corp., 128 Thompson St., Bridgeport, Conn.
Condon, Frank, 25 Broadway, New York, N. Y.
Conneaut Can Co., Inc., The, Whitney Road, Conneaut, Ohio
Connecticut Hard Rubber Co., 407 East St., New Haven, Conn.
Connecticut Plastic Products Co., 124 N. Elm St., Waterbury, Conn.
Consolidated Box Co., Inc., 3302 N. Armenia Ave., P. O. Box 4341, Tampa, Fla.
Consolidated Fruit Jar Co., New Brunswick, N. J.
Consolidated Lithographing Corp., 1013 Grand St., Bklyn, N. Y.
Consolidated Molded Plastics Corp., Scranton, Pa.
Consolidated Packaging Machinery Co., 1400 West Ave., Buffalo 13, N. Y.
Consolidated Paper Co., E. First St., Monroe, Mich.
Consolidated Paper & Box Mfg. Co., 413 E. Canal St., Richmond, Va.
Consolidated Paper Bag Co., Somerville, Mass.
Consolidated Paper Box Co., 6 Vernon St., Somerville, Mass.
Consolidated Water & Power Co., Wisconsin Rapids, Wis.
Container Company, The, 975 Glenn St., Van Wert, Ohio

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Container Corporation of America, 111 W. Washington St., Chicago 2, Ill.
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Continental Bag Specialty Corp., 601 W. 26th St., New York, N. Y.
Continental Can Co., 100 E. 42nd St., New York 17, N. Y.
Continental Container Corp. (See Scandore Paper Box Co.)
Continental Folding Paper Box Co., Inc., Richfield, N. J.
Continental Lithograph Corp., 952 E. 72nd St., Cleveland, Ohio
Continental Paper Co., Richfield Park, N. J.
Continental Paper Products Co., Box 4116, South Denver Station, Denver 9, Colo.
Continental Plastics Corp., 314 W. Erie St., Chicago, Ill.
Cooper, R. G., 7376 Grand River Ave., Detroit, Mich.
Cordiano Can Co., Inc., 20 Grand Ave., Bklyn, N. Y.
Corn Products Refining Co., 17 Battery Place, New York, N. Y.
Cornell Wood Products Co., 230 N. Michigan Ave., Chicago, Ill.
Corning Glass Works, Corning, N. Y.
Cottonluxe Mfg Co., 597 E. 137th St., New York 54, N. Y.
Cottrell, C. B. & Sons, Co., Claybourn Div., 3713 N. Humboldt Ave., Milwaukee 1, Wis.
Coughlin Mfg. Co., 697–701 E. 132nd St., New York, N. Y.
Cournand, E. L. Inc., 285 Madison Ave., N. Y.
Cowles, H. A. Box & Display Co., 163 St. Paul St., Rochester, N. Y.
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Craftsman Label Co., 120 W. 20th St., New York, N. Y.
Craven-Whittaker Co., 215 Georgia Ave., Providence, R. I.
Crawford, John W. Co., 160 Varick St., New York, N. Y.
Creative Printmakers Group, 14–16 W. 17th St., New York 11, N. Y.
Crescent Box Corporation, 621 E. Erie St., Phila., Pa.
Crescent Burlap Bag Co., 4124 Toulouse St., New Orleans 6, La.
Crescent Ink & Color Co. of Pa., 464 N. 5th St., Phila. 23, Pa.
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Croce, Isabel M., 137 E. 38th St., New York, N. Y.
Crocker Union, 735 Harrison St., San Francisco, Calif.
Crompton-Aldelphia, John Corp., 145 W. Columbia Ave., Phila., Pa.
Cromwell Paper Co., The, 4801 S. Whipple St., Chicago, Ill.
Crook Paper Box Co., 110–120 E. 10th Ave., N. Kansas City, Mo.
Cross Paper Products Corp., 2595 3rd Ave., New York, N. Y.
Crowell Corp., The, Yorklyn, Del.
Crown Can Co., Erie Ave., Phila., Pa.
Crown Cork & Seal Co., Eastern Ave. & Kresson St., Baltimore, Md.
Crown-Willamette Paper Co., 343 Sansome St., San Francisco, Calif.
Crown Zellerbach Corp., 343 Sansome St., San Francisco, Calif.
Crunden, Martin Mfg. Co., 2nd & Gratiot St., St. Louis, Mo.
Cruver Mfg. Co., 2456–60 Jackson Blvd., Chicago, Ill.
Cruze, Charles, 2008 W. 7th St., Los Angeles 5, Calif.
Crystal Bag Co., Chickamauga, Ga.
Crystal Tissue Co., Middletown, Ohio
Crystal Transparent Corp., 136 W. 21st St., New York 11, N. Y.
Crystal Tube Corp., 538 S. Wells St., Chicago, Ill.
Cupples Co., 7th & Spruce Sts., St. Louis, Mo.
Cupples-Hess Corp., 4175 N. Kingshighway, St. Louis 15, Mo.
Cutler-Hammer, Inc., 315 N. 12th St., Milwaukee, Wis.

D

D & W Tool Co., 601 E. Broadway, Glendale, Calif.
D'Addario, Thomas, 11 W. 42nd St., New York, N. Y.
Danbury Square Box Co., The, P. O. Box 729, Danbury, Conn.
Daniels Mfg. Co., Rhinelander, Wis.
Datz Mfg. Co., 537–41 N. 3rd St., Phila., Pa.
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Davies, Harry Molding Co., 1428 N. Wells St., Chicago, Ill.
Davison, Geo. M., 50 E. 42nd St., New York, N. Y.
Davison Chemical Corp., The, 20 Hopkins Place, Baltimore 3, Md.
Dayton Insulating Molding Co., 207 E. 6th St., Dayton, Ohio
Decorated Containers Co., 1478 Chestnut Ave., Hillside, N. J.
Decotone Products, Div. Fitchburg Paper Co., 103 Kimball St., Fitchburg, Mass.
Deerfield Glassine Co., Monroe Bridge, Mass.
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Dejonge, Louis & Co., 161 6th Ave., New York, N. Y.
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Delta Paper Boxes, Inc., 34 Hubert St., New York, N. Y.
Denina, James Andrew, 509 5th Ave., New York 17, N. Y.
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Desky, Donald, 630 5th Ave., New York, N. Y.
Detecto Scales, Inc., 1 Main St., Bklyn, N. Y.
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Dexter, C. H. & Sons, Inc., 100 Canal, Windsor Locks, Conn.
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Dickerman Box Co., 36 Landsdowne St., Cambridge, Mass.
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Dodge, E. F., Paper Box Co., 124 Central St., Leominster, Mass.
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Dorfman, A. Co., Inc., 59 W. 19th St., New York, N. Y.
Double Duty Products, Inc., 6919 Lorain Ave., Cleveland 2, Ohio
Dow Chemical Co., The, Midland, Mich.
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Drell Novelty Mfg. Co., The, 519 8th Ave., New York 18, N. Y.
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E

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Eagle Paper Box Co., 720 E. 11th St., New York, N. Y.
Eagle Paper Box Mfg. Co., 1755 N. Monitor Ave., Chicago, Ill.
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Eagle Printing Ink Co., Div. General Printing Ink Corp., 100 6th Ave., New York, N. Y.
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Eppy, Samuel Inc., 254 W. 31st St., New York, N. Y.
Equitable Paper Bag Co., Inc., 47-02 31st Place, Long Island City, N. Y.
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F

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General Molding Co., Robbins & Rockledge Aves., Rockledge, Pa.
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H

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Hardin Bag & Burlap Co., Inc., The, 1054 Constance, New Orleans, La.
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I

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International Mailing Tube & Wrapper Co., 29-05 Review Ave., Long Island City, N. Y.
International Molded Plastics, Inc., 43–83 W. 35th St., Cleveland, Ohio
International Paper Box Machine Co., The, 315 Main St., Nashua, N. H.
International Paper Co., 220 E. 42nd St., New York, N. Y.
International Paper Products, Div. of International Paper Co., 220 E. 42nd St., New York, N. Y.
International Plastics Corp., Morristown, N. J.
International Printing Ink, Div. of Interchemical Corp., 350 Fifth Ave., New York 1, N. Y.
International Staple & Machine Co., Penn & Jefferson Sts., Clifton Heights, Pa.
Interstate Bag Co., Walden, N. Y.
Interstate Folding Box Co., Verity Parkway, Middletown, Ohio
Irvington Varnish & Insulator Co., 6 Argyle Terrace, Irvington, N. J.
Ivers-Lee Co., 215 Central Ave., Newark, N. J.

J

J. L. Paper Box Co., North Attleboro, Mass.
Jamieson, C. E. & Co., 1962 Trombly, Detroit, Mich.
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Johnson, Charles Ebey & Co., 10th St. at Lombard, Phila., Pa.
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Johnston Tin Foil & Metal Co., The, 6100 S. Broadway, St. Louis 11, Mo.
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K

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Kimble Glass Co., Vineland, N. J.
Kindred, MacLean & Co., Inc., 43–01 22nd St., Long Island City 1, N. Y.
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King Plastic Corp., Speer Blvd. & Lincoln St., Denver, Colo.
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Koster, Louis H., 143 E. 40th St., New York, N. Y.
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Kurz-Kasch, Inc., 1421 S. Broadway, Dayton, Ohio

L

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Northern Industrial Chemical Co., 7 Elkins St., S. Boston, Mass.
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O

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P

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Pedersen, H. Mfg. Co., 723 Crocker St., Los Angeles 21, Calif.
Peerless Molded Plastics, 410 Hamilton St., Toledo, Ohio
Peerless Packers, 533 Greenwich St., New York, N. Y.
Peerless Paper Mills, Inc., Oaks, Pa.
Peerless Products Mfg. Co., 3338 Joy Rd., Detroit, Mich.
Peerless Roll Leaf Co., Inc., 4511-4513 New York Ave., Union City, N. J.
Peerless Tube Co., 58-76 Locust Ave., Bloomfield, N. J.
Pejepscot Paper Co., 420 Lexington Ave., New York 17, N. Y.
Penn Lithographing Co., 47th & Westminster Ave., Phila., Pa.
Pennsylvania Glass Products Co., 428-432 N. Craig St., Pittsburgh, Pa.
Pequannock Valley Paper Co., Butler, N. J.
Perfect Finishing Co., Inc., 200 Varick St., New York, N. Y.
Perfection Plastic Products, 900 Passaic Ave., East Newark, N. J.
Perfumers & Jewelers Box Co., 635 6th Ave., New York, N. Y.
Peters Machinery Co., 4700 Ravenswood Ave., Chicago 40, Ill.
Peterson Bros., 165 N. Elizabeth St., Chicago, Ill.
Petroleum Specialties, Inc., 400 Madison Ave., New York 17, N. Y.
Pharmacy Paper Box Co., 3401 W. Division St., Chicago, Ill.
Phelps Can Co., Fulton & Eagle Sts., Baltimore, Md.
Phenix Associates, 270 Lafayette St., New York, N. Y.
Philadelphia Can Co., 225 New St., Phila., Pa.
Philadelphia Carpenter Container Co., Inc., 1823 East Venango St., Phila., Pa.
Philadelphia Quartz Co., 126 S. Third St., Phila. 6, Pa.
Phoenix Metal Cap Co., 2444 W. 16th St., Chicago, Ill.
Pictorial Paper Package Corp., Aurora, Ill.
Pie-Pak Co., Inc., 1300 Hudson St., Hoboken, N. J.
Pilliod Cabinet Co., The, Swanton, Ohio
Pine-Land Bag Corp., Inc., Pascagoula, Miss.
Pioneer Paper Box Co., 1417 Washington Ave., S., Minneapolis, Minn.
Pitkin, Lucius Inc., 47 Fulton St., New York, N.Y.
Pittsburgh Plastics Co., Inc., 1304-06 5th Ave., New Kensington, Pa.
Pittsburgh Testing Laboratory, Stevenson St. at Locust, Pittsburgh, Pa.
Place, Roland P. Co., 410 E. Hines St., Midland, Mich.
Plano Molding Co., 113 S. Center Ave., Plano, Ill.
Plaskon Div., Libbey-Owens Ford Glass Co., 2112-24 Sylvan Ave., Toledo 6, Ohio
Plastal Specialties Co., 3215 Western Ave., Seattle, Wash.
Plas-Tex Corp., 653 N. Robertson Blvd., Los Angeles, Calif.
Plastic & Die Cast Products Corp., 1010 E. 62nd St., Los Angeles, Calif.
Plastic & Rubber Products Co., 2100 Hyde Park Blvd., Los Angeles, Calif.
Plastic Co., Inc., 7457 Melrose Ave., Los Angeles, Calif.
Plastic Coating Corp., The, Holyoke, Mass.
Plastic Engineering, Inc., 8506 Lake Ave., Cleveland 2, Ohio
Plastic Industries, Inc., 160 Northfield Rd., Bedford, Ohio
Plastic Inlays, Inc., Summit, N. J.
Plastic Mfgs., Inc., 280 Fairfield Ave., Stamford, Conn.
Plastic Molded Arts, Inc., 12-04 44th Ave., Long Island City, N. Y.
Plastic Molding Corp., Sandy Hook, Conn.
Plastic Moldings Corp., 859 Hathaway St., Cincinnati, Ohio
Plastic Products, Inc., 6473 Georgia Ave., Detroit, Mich.
Plastic Products, Inc., 415 Lexington Ave., New York, N. Y.
Plastic Research Foundation, 91 Harvard Ave., Brookline, Mass.
Plastic Turning Co., Inc., Leominster, Mass.
Plastic-Ware, Inc., 238 Williams St., New York, N. Y.
Plasticraft Associates, 155 E. Ohio St., Chicago, Ill.
Plastics, Inc., 813 Main St., Bradley Beach, N. J.
Plastics, Inc., 20 E. Chicago Ave., St. Paul, Minn.
Plastics Engineering Co., 1603 Geele Ave., Sheboygan, Wis.
Plastimold, Inc., P. O. Box 628, Attleboro, Mass.
Platt Corp., 1415 Key Highway, Baltimore, Md.
Plax Corp., Hartford, Conn.
Plumly, Eugene K. Co., 1325 Federal St., Phila., Pa.
Plumly, George W. Co., Inc., 417 N. 8th St., Phila., Pa.
Pneumatic Scale Corp., Ltd., 77 Newport Ave., North Quincy, Mass.
Pohlig Bros., 2411 E. Franklin St., Richmond, Va.
Poinsettia, Inc., 98 Cedar Ave., Pitman, N. J.
Pollock Paper & Box Co., 2236 S. Lamar, Dallas, Texas
Pope & Gray, Inc., 95 Morton St., New York, N. Y.
Port Huron Sulphite & Paper Co., Ft. Washington Ave., Port Huron, Mich.
Post & Johnson, Inc., 71 Church St., Hartford, Conn.
Potdevin Machine Co., 1242 38th St., Bklyn 18, N. Y.
Potter & Brumfield Mfg. Co., Inc., 615-17 N. Gibson St., Princeton, Ind.
Precision Molded Plastics Co., Inc., 2014 W. 53rd St., Cleveland, Ohio
Precision Plastics Co., 1724 W. Indiana Ave., Phila., Pa.
Premier Bag Co., Inc., Newark & Bage Aves., Lyndhurst, N. J.
Prentiss, Geo. W. & Co., 439 Dwight St., Holyoke, Mass.
Prescott, J. L. Co., Passaic, N. J.
Price, M. B. Associates, 3301 Empire State Bldg., New York, N. Y.
Print-A-Tube Co., 44 Lexington Ave., Passaic, N. J.
Printloid, Inc., 93 Mercer St., New York 12, N. Y.
Process Displays, Inc., 504 N. Water St., Milwaukee, Wis.
Producers Dealers Supply Co., Market & Front Sts., Boston, Mass.
Progress Lithographing Co., The, 502 Main St., Reading, Ohio
Progressive Bag Co., Inc., 67 Franklin St., New Haven, Conn.
Pro-phy-lac-tic Brush Co., Pine St., Florence, Mass.
Protective Coatings, Inc., P. O. Box 56, Strathmoor Station, Detroit, Mich.
Pulp Reproduction Co., 3000 W. Clarke St., Milwaukee, Wis.
Purepac Corp., 511 E. 72nd St., New York, N. Y.
Pyro Plastics Co., The, 526 North Ave., E. Westfield, N. J.
Pyrotex Leather Co., 287 Whitney St., Leominster, Mass.
Pyroxylin Products, Inc., 4851 S. St. Louis Ave., Chicago, Ill.

Q

Quality Park Box Co., 450 N. Syndicate St., St. Paul, Minn.
Queen City Paper Co., The, Akron, Ohio
Quincy Paper Box Co., 230 N. Third St., Quincy, Ill.
Quinn, Don L. Co., 609 N. La Salle St., Chicago, Ill.

R

R. C. Can Co., 101 Chamber St., St. Louis, Mo.
Racine Universal Motor Co., 1637 Gould St., Racine, Wis.
Racquette River Paper Co., The, Potsdam, N. Y.
Randolph Box & Label Co., 843 W. Van Buren St., Chicago, Ill.
Randolph Paper Box Co., 1313 E. Grace St., Richmond, Va.
Rapids-Standard Co., Inc., The, 535 Bond Ave., N. W., Grand Rapids 2, Mich.
Rathbun Molding Corp., 290 Rochester St., Salamanca, N. Y.
Ray, Ellen Laboratories, 95 Lorimer St., Bklyn, N. Y.
Raymond Bag Co., 1937 Jackson Blvd., Middletown, Ohio
Raymond Laboratory, Inc., 261 E. 5th St., St. Paul, Minn.
Read, Robert E. Inc., Dexter, N. Y.
Recto Molded Products, Inc., Appleton & B. & O.-R.R., Cincinnati, Ohio
Redington, F. B. Co., 112 S. Sangamon St., Chicago 6, Ill.
Reed Container Sales Corp., 522 5th Ave., New York, N.Y.
Reed Tissues Corp., Little Falls, N. Y.
Reeves Pulley Co., Columbus, Ind.
Reilly Tar & Chemical Corp., P. O. Box 125, Indianapolis, Ind.
Reinhold, F. E. Co., 7001 McKinley Ave., Los Angeles, Calif.
Remler Co., Ltd., 2101 Bryant St., San Francisco, Calif.
Republic Paperboard Co., The, 3347 Madison Rd., Cincinnati, Ohio
Republic Steel Corp., Republic Bldg., Cleveland 1, Ohio
Resina Automatic Machinery Co., Inc., 125 Wolcott St., Bklyn, N. Y.
Resinous Products & Chemical Co., The, 222 W. Washington Sq., Phila., Pa.
Resistoflex Corp., Belleville, N. J.
Ressinger, Paul, 8 S. Michigan Ave., Chicago, Ill.
Rexford Paper Co., 1715 W. Canal St., Milwaukee, Wis.
Reyburn Mfg. Co., Inc., The, Allegheny Ave. at 32nd St., Phila., Pa.
Reynolds Metals Co., Reynolds Metals Bldg, 3rd & Grace Sts., Richmond, Va.
Reynolds Spring Co., Molded Plastics Div., Cambridge, Ohio
Rhinelander Paper Co., Rhinelander, Wis.
Richard Machine Co., 31 S. Place, Battle Creek, Mich.
Richardson Co., The, Melrose Park, Chicago, Ill.
Richardson Taylor Globe Corp., 4501 Mitchell Ave., Cincinnati, Ohio
Riegel Paper Corp., 342 Madison Ave., New York 17, N. Y.
Rinkle Crinkle Paper Co., 326 A St., Boston, Mass.
Ritchie, W. C. & Co., 8801 S. Baltimore Ave., Chicago 17, Ill.
River Valley Tissue Mills, Inc., Phoenix, N. Y.
Roberts, Lewis Inc., 72 Union St., Newark, N. J.
Robertson Co., The, Hinsdale, N. H.
Robertson Can Co., Sprinfield, Ohio
Robertson, G. E. & Co., Hinsdale, N. H.
Robertson Paper Box Co., Inc., Montville, Conn.
Robinson, A. E. & Co., 605 W. Washington St., Chicago, Ill.
Robinson Clay Product Co., 101 Park Ave., New York, N. Y.
Robinson-Spear Corp., 345 W. 40th St., New York, N. Y.
Robinson Tag & Label Co., 460 W. 34th St., New York, N. Y.
Rochester Folding Box Co., P. O. Box 1012, Rochester, N. Y.
Rock City Paper Box Co., Inc., 800 12th Ave., New Nashville, Tenn.
Rockford Fibre Container Co., Rockford, Ill.
Rode & Brand, 200 William St., New York, N. Y.
Roesch, Louis Co., 1886 Mission St., San Francisco, Calif.
Rogan Bros., 180 N. Wacker Drive, Chicago, Ill.
Rogers, Edward H. Inc., 292 Ave. B, New York, N. Y.
Rogers, V. F., 2454 15th St., Denver 11, Colo.
Rohm & Haas Co., Inc., 222 W. Washington Sq., Phila., Pa.
Roman, Martin L. Co., The, 146 W. 25th St., New York 1, N. Y.
Rondout Paper Mills, Inc., Napanoch, N. Y.
Roosen, H. D. Co., 78 20th St., Bklyn 32, N. Y.
Rosner Container Co., 143 Greene St., New York, N. Y.
Rossotti Lithographing Co., Inc., 8511 Tonnelle Ave., N. Bergen, N. J.
Rotogravure Div., General Printing Ink Corp., 100 6th Ave., New York, N. Y.
Rotogravure Engineering Co., 299 Marginal St., E. Boston 28, Mass.
Roto-Lith, Ltd., 15 W. 18th St., New York, N. Y.
Rowell, E. N. Co., Inc., Batavia, N. Y.
Royal Moulding Co., 69 Gordon Ave., Providence, R. I.
Royal Paper Corp., 210 11th Ave., New York, N. Y.
Royal Paper Box Co., 1136 S. Los Angeles St., Los Angeles 15, Calif.
Royal, Thomas M. & Co., 5800 N. 7th St., Phila. 20, Pa.
Rubin, Joseph & Sons, Inc., 35 Meserole Ave., Bklyn, N. Y.
Ruckelshaus & Co., Inc., 545 5th Ave., New York, N. Y.
Rudnick, A. & A., Inc., 342 W. 14th St., New York, N. Y.
Rushmore Paper Mills, Inc., Natural Dam, New York

Russell Products Co., Harrison Bldg., Phila., Pa.
Rutherford Machinery Co., Div. General Printing Ink Corp., 100 6th Ave., New York 13, N. Y.

S

Sacramento Bag Mfg. Co., 810 Second St., Sacramento, Calif.
Safe-ty Socket Co., 306 S. State St., Gibson City, Ill.
Safeway Products Corp., 34 Union Sq., New York, N. Y.
St. Louis Plastic Moulding Co., 3515 N. Florissant, St. Louis, Mo.
St. Louis Sticker Co., 1906 Pine St., St. Louis, Mo.
St. Regis Paper Co., 230 Park Ave., New York 17, N. Y.
Salisbury Mfg. Co., 501 Roosevelt Ave., Central Falls, R. I.
Salwen, Joe Paper Co., 405 E. 4th St., New York, N. Y.
Salz Bros., Inc., 44 W. 28th St., New York, N. Y.
Sample-Durick Co., Inc. P. O. Box 207, Chicopee, Mass.
Sanderson Products, Inc., 48 W. 48th St., New York, N. Y.
Sanitary Paper Mills, Inc., East Hartford, Conn.
Saranac Machine Co., 376 W. Main, Benton Harbor, Mich.
Say-Way Industries, 4875 E. Eight Mile, Detroit 13, Mich.
Scandia Mfg. Co., Belleville Turnpike, N. Arlington, N. J.
Scandore Paper Box Co., Steuben St. & Park Ave., Bklyn, N. Y.
Scheele, Edwin H., 419 4th Ave., New York, N. Y.
Schleicher, F. J. Paper Co., 1811 Chouteau St., St. Louis, Mo.
Schmeer's Paper Box Co., Inc., 204 Herald Place, Syracuse, N. Y.
Schmidt & Ault Paper Co., 423 King's Mill Rd., York, Pa.
Schmidt, Henry & Bro., Inc., 328 Vine St., Phila., Pa.
Schmidt Lithograph Co., 461 2nd St., San Francisco, Calif.
Schmidt Bros. Co., 912 Brown St., Phila., Pa.
Schneider Bros. Co., 912 Brown St., Phila., Pa.
Schoettle, Edwin J. Co., 533 N. 11th St., Phila., Pa.
Schorsch & Co., Inc., 120 Eastern Blvd., New York 54, N. Y.
Schultz Folding Box Co., Eleventh & Pestalozzi, St. Louis, Mo.
Schulz, A. Geo. Co., 433 W. Clybourn St., Milwaukee 1, Wis.
Schunak, C. E., Inc., 470 Center St., Meriden, Conn.
Schurmann, P. A., Inc., 449 Troutman St., Bklyn, N. Y.
Schusterman, Wm. V., 1280 Ocean Ave., Bklyn, N. Y.
Schutz, Thomas A., Co., 201 N. Wells St., Chicago, Ill.
Schutze Bros., 152 Chamber St., New York, N. Y.
Schwab & Frank, Inc., 243 W. Congress, Detroit, Mich.
Schwarm & Jacobus Co., The, 1216 Jackson St., Cincinnati, Ohio
Schwerdtle Stamp Co., 9 Cannon St., Bridgeport, Conn.
Scientific Filter Co., 1 Franklin Sq., New York 7, N. Y.
Scott & McDonald, Inc., 45 William St., Everett, Mass.
Scott, Geo. S. Mfg. Co., The, W. Main St., Plantsville, Conn.
Scovill Mfg. Co., 99 Mill St., Waterbury, Conn.
Seal, Inc., 8 Brook, Shelton, Conn.
Sealright Co., Inc., The, S. First St., Fulton, N. Y.
Seaman Box Co., Inc., 29 Ninth Ave., New York, N. Y.
Sears, Merle Paper Box Co., Danville, Ill.
Security Bag Co., The, Lock & Cooper Sts., Cincinnati (Lockland), Ohio
Seder & Son Molded Products Co., 324 S. Meldrum St., Ft. Collins, Colo.
Seeley Tube & Box Co., 170 Thomas St., Newark, N. J.
Sefton Fibre Can Co., 3275 Big Bend Blvd., St. Louis, Mo.
Seinsheimer Paper Corp., Colerain, Alfred & Cook Sts., Cincinnati, Ohio
Self-Locking Carton Co., 589 E. Illinois St., Chicago, Ill.
Senoso Paper Co., Inc., Phoenix, N. Y.
Service Paper Box Co., 309 N. Third St., St. Louis, Mo.
Sexton Can Co., Inc., 31 Cross St., Everett, Mass.
Seymour & Peck Co., 565 W. Washington Blvd., Chicago, Ill.
Seymour Products Co., The, River St., Seymour, Conn.
Seymour's & Co., 101 S. Wells St., Chicago, Ill.
Shampain, Citron, Clark, Inc., 43 York St., Bklyn 1, N. Y.
Shaw Insulator Co., 150 Coit St., Irvington, N. J.
Shaw Paper Box Co., Charles St., Meriden, Conn.
Shaw Paper Box Co., 37 Sabin St., Pawtucket, R. I.
Shawmut Waxed Paper Co., Holliston, Mass.
Shawprint, Inc., Lowell, Mass.
Sheller Mfg. Corp., Portland, Ind.
Shellmar Products Co., Mt. Vernon, Ohio
Shepherd, J. H. Son & Co., 1820 East Ave., Elyria, Ohio
Sherman Paper Products Corp., 156 Oak St., Newton Upper Falls 64, Mass.
Shomer-Majestic Box Corp., 510 5th Ave., New York, N. Y.
Shoup-Owens, Inc., 1100 Adams St., Hoboken, N. J.
Shuman, Frank G., Co., The, 602 W. Jackson Blvd., Chicago, Ill.
Shuttleworth Carton Co., 474 W. Broadway, New York 12, N. Y.
Siebold, J. H. & G. B. Inc., 47 Watts St., New York, N. Y.
Siegel, A. L. Co., Inc., 274 Lafayette St., Newark, N. J.
Signode Steel Scrapping Co., 2600 North Western Ave., Chicago 47, Ill.
Sillocks-Miller Co., The, 10 W. Parker Ave., S. Orange, N. J.
Simco Co., The, 4929 York Rd., Phila., Pa.
Simplex Paper Box Corp., Janet & Marshall Ave., Lancaster, Pa.
Simplex Texture Reproductions, Inc., 225 Varick St., New York, N. Y.
Simplex Wrapping Machine Co., 615 23rd Ave., Oakland, Calif.
Sinclair & Carroll Co., 591 11th Ave., New York, N. Y.
Sinclair & Valentine Co., 611 W. 129th St., New York 27, N. Y.
Single Service Containers, Inc., 205 E. 42nd St., New York 17, N. Y.
Sinko Tool & Mfg. Co., 351 N. Crawford Ave., Chicago, Ill.
Sisalkraft Co., The, 205 W. Wacker Drive, Chicago 6, Ill.
Sleight Metallic Ink Co., 538 N. Third St., Phila., Pa.
Sleight Metallic Ink Co. of Illinois, 717 W. Congress St., Chicago, Ill.
Slichter Box Co., Inc., 126 S. Church St., Mohnton, Pa.
Smeallie & Boorhees, Inc., Amsterdam, N. Y.
Smith, H. P. Paper Co., 5001 W. 66th St., Chicago, Ill.
Smith, S. K. Co., 2857 Northwestern Ave., Chicago, Ill.
Smith-Emery Co., 920 Santee St., Los Angeles, Calif.
Smith-Emory & Co., 651 Howard St., San Francisco, Calif.
Smith-Lustig Paper Box Mfg. Co., The, 2165 E. 31st St., Cleveland, Ohio.
Smith & Winchester Mfg. Co., The, S. Windham, Conn.
Smith Paper, Inc., Lee, Mass.
Smithe, F. L. Machine Co., Inc., 645 W. 44th St., New York, N. Y.
Snyder, Geo. H., Inc., 3631 N. Smedley St., Phila., Pa.
Sobenite, Inc., 1344 W. Sample St., South Bend, Ind.
Sonoco Products Co., Hartsville, S. C.
Southern California Bag Co., 1328 Santa Fe Ave., Los Angeles, Calif.
Southern Craft Div., International Paper Co., 220 E. 42nd St., New York, N. Y.
Southern Paper Co., Ltd., 535 Tchoupitoulas St., New Orleans, La.
Southern Plastics Co., 906-08 Main St., Columbia 10, S. C.
Southern States Bag Co., Jacksonville, Fla.
Southern Waxed Paper Co., 840 Woodrow Ave., S. W. Atlanta, Ga.
Southwest Machine & Plastic Co., 5419 McKinley Ave., Los Angeles, Calif.
Spaulding China Co., Inc., Sebring, Ohio
Specialty Insulation Mfg. Co., Inc., 55 Center St., Hoosick Falls, N. Y.
Specialty Paper Box Co., 255 McKibben St., Bklyn, New York
Specialty Papers Co., The, 802 Miami Chapel Rd., Dayton, Ohio
Speedway Mfg. Co., 1834 S. 52nd Ave., Cicero, Ill.
Springfield Coated Paper Corp., 9th & Bailey Sts., Camden, N. J.
Sprouty, Dan A. Bag Co., The, 934 Lakewood Ave., Baltimore 24, Md.
Spuehler, Ernst A., 540 N. Michigan Ave., Chicago, Ill.
Standard Can Co., 2655 W. Van Buren St., Chicago, Ill.
Standard Cap & Molding Co., Inc., 307 S. Eaton St., Baltimore, Md.
Standard Conveyor Co., 315 N. W. 2nd, N. St. Paul 9, Minn.
Standard-Knapp Corp., Main St., Portland, Conn.
Standard Molding Co., Baltimore, Md.
Standard Novelty Box Co., 385 Girard Ave., New York, N. Y.
Standard Paper Box Co., 426 Cass Ave., Detroit, Mich.
Standard Paper Box Corp., 3837 S. Broadway Place, Los Angeles, Calif.
Standard Plastics Co., 62 Water St., Attleboro, Mass.
Standard Products Co., The, Thermo-Plastics Div., 505 Boulevard Bldg., Detroit, Mich.
Standard Specialty & Tube Co., Lower Penn Ave., New Brighton, Pa.
Stanley Works, The, Lake St., New Britain, Conn.
Star Case Co., 76 Madison Ave., New York, N. Y.
Stark Bros. Ribbon Co., 24 W. 40th St., New York, N. Y.
Staude, E. G. Mfg. Co., 2675 University Ave., St. Paul, Minn.
Stecher-Traung Lithograph Corp., 274 North Goodman St., Rochester 7, N. Y. 600 Battery St., San Francisco, Calif.
Stecker Paper Box Co., 1420 W. 4th St., Detroit, Mich.
Steel & Tin Products Co., Inc., President & Faun Sts., Baltimore, Md.
Steiles, H. A. & Co., 174 Portland St., Boston, Mass.
Stein, A. & Co., 1143 W. Congress St., Chicago, Ill.
Stein Hall & Co., Inc., 285 Madison Ave., New York 17, N. Y.
Stein, Hall Mfg. Co., 2841 S. Ashland Ave., Chicago 8, Ill.
Stengren, Jon, 6140 Saunders St., Forest Hills, N. Y.
Stensgaard, W. L. & Associates, 346 N. Justine St., Chicago, Ill.
Sterling Bag Co., 11 Green Lane, Bklyn, N. Y.
Sterling Injection Molding, Inc., 277 Military Rd., Buffalo 7, N. Y.
Sterling Plastics Co., 1140 Commerce Ave., Union, N. J.
Sterling Seal Co., Erie, Pa.
Sterling-Wasser Box Co., 221 W. 7th Ave., Homestead, Pa.
Sterrett, D. B., Co., 56 Pearl St., Bklyn, N. Y.
Stevens & Thompson Paper Co., Greenwich, N. Y.
Stevens, C. E. Bros., Inc., 12 W. Barre St., Baltimore, Md.
Stevens-Nelson Paper Corp., The, 109 E. 31st St., New York, N. Y.
Stokes, F. J. Machine Co., 5990 Tabor Road, Phila., 20, Pa.
Stokes, Joseph Rubber Co., 322 Webster St., Trenton, N. J.
Stokes & Smith Co., Frankford, Phila. 24, Pa.
Strange, John Paper Co., Menasha, Wis.
Strobridge Lithographing Co., The, Cincinnati (Norwood), Ohio
Strong, Cobb & Co., Inc., Lisbon Road & Evans Ave., Cleveland, Ohio
Strouse, Adler Co., The, 78 Olive St., New Haven, Conn.
Stuber & Kuck, 2600 S. Adams St., Peoria, Ill.
Style Molders, Inc., 353 McKibben, Bklyn, N. Y.
Sulik Mfg. Co., 412 River St., Seattle, Wash.
Sun Chemical & Color Co., Div. General Printing Ink Corp., 309 Sussex St., Harrison, N. J.
Sun Tube Corp., 181 Long Ave., Hillside, N. J.
Superior Can Co., Inc., 90 Varick Ave., Bklyn, N. Y.
Superior Folding Box Co., 4170 Geraldine Ave., St. Louis, Mo.
Superior-Lawrence Bag Co., Inc., 370 Lexington Ave., New York, N. Y.
Superior Plastic Co., 643 N. Kedzie Ave., Chicago, Ill.
Superior Printing Ink Co., 295 Lafayette St., New York, N. Y.
Super-Seal Container Corp., 401 Southern Bldg., Washington, D. C.
Sutherland Paper Co., Rutledge & Roberts Sts., Kalamazoo, Mich.
Swan Metal Cap Co., 108 N. Jefferson St., Chicago, Ill.
Sweet Bros. Paper Mfg. Co., Phoenix, N. Y.
Sweetnam, Geo. H. Inc., 282-286 Portland St., Cambridge, Mass.
Swibold, Duane, 1006 Mohawk, Royal Oak, Mich.
Swift, G. W., Jr., Inc., Trenton Pike, Bordentown, N. J.
Swindell Bros., Bayard & Russell Sts., Baltimore, Md.
Sylvania Industrial Corp., 122 E. 42nd St., New York 17, N. Y.
Synthetic Molded Products, Inc., Tower Hill Rd., Wakefield, R. I.
Synthetic Plastics Co., 88 St. Francis St., Newark, N. J.
Syntron Co., P. O. Box 2200, Homer City, Pa.
Synvar Corp., 109 Lombard St., Wilmington, Del.

T

Taber Instrument Corp., 111 Goundry St., North Tonawanda, N. Y.
Tablet & Ticket Co., The, 1021 Adams St., Chicago 7, Ill.
Taffel Bros., Inc., 95 Madison Ave., New York, N. Y.
Talmadge Printing Co., 284 Pearl St., New York, N. Y.
Tamm & Co., 61 E. 11th St., New York, N. Y.
Tarpey, Thomas, 1017 Nelson Ave., Bronx, N. Y.
Taylor Box Co., 73 Eagle St., Providence, R. I.
Tech-Art Plastics Co., 41-01 36th Ave., Long Island City, N. Y.
Telex Products Co., Telex Park, Minneapolis, Minn.
Tennessee Eastman Corp., Kingsport, Tenn.
Tennessee Paper Mills, Chattanooga, Tenn.
Tension Envelope Corp., 345 Hudson Street, New York, N. Y.
Terkelsen Machine Co., 326 A Street, Boston, Mass.
Terre Paper Box Co., 1824 S. Bishop St., Chicago, Ill.
Texas Paper Box Mfg. Co., 3720 La France St., Dallas, Texas
Textileather Corp., Stickney Ave. & Dayton St., Toledo, Ohio
Thelander, Clement J., 646 N. Michigan Ave., Chicago, Ill.
Ther Electric & Machine Works, 17 S. Jefferson St., Chicago, Ill.
Thilmany Pulp & Paper Co., Kaukauna, Wis.
Thoma Paper Box Co., Inc., 642-658 Clinton St., Buffalo, N. Y.
Thompson Can Co., 1304 So. Austin St., Dallas 2, Texas
Thwing-Albert Instrument Co., 3339 Lancaster Ave., Phila., Pa.
Tight Closure Co., 3056 West Meinecke Ave., Milwaukee, Wis.
Tilton & Cook Co., 38 Spruce St., Leominister, Mass.
Tissue Co., Saugerties, N. Y.
Titian Plastic Products Co., 1221 West 11th St., Los Angeles, Calif.

Tobias, Max N. Co., 328 Cortez St., New Orleans, La.
Toledo Paper Box Co., 1112-24 True St., Toledo 1, Ohio
Toledo Plastics Co., 397 Phillips Ave., Toledo, Ohio
Toledo Scale Co., 1025 Telegraph Rd., Toledo 12, Ohio
Tompkins' Label Service, Frankfort Ave. at Allegheny Ave., Phila., Pa.
Toronto Paper Mfg. Co., The, Toronto, Ohio
Tower Envelope Co., 1263 Virginia Ave., New York 60, N. Y.
Trade Lithograph & Printing Co., Inc., 684 Broadway, New York, N. Y.
Transcontinental Container Corp., 107-05 Northern Blvd., Corona, L. I., N. Y.
Trans-Pac Services, Inc., 602 West 52nd St., New York 19, N. Y.
Transparent Specialties Corp., 1120 Carnegie Ave., Cleveland, Ohio
Trautmann, Bailey & Blampey, 13 Laight St., New York, 13, N. Y.
Traver Corp., 358-368 West Ontario St., Chicago 10, Ill.
Trenton Folding Box Co., Ewing & Ogden Sts., Trenton, N. J.
Trenton Metals & Plastics Co., 10 Prince St., Trenton, N. J.
Triangle Ink & Color Co., Inc., 26-30 Front St., Bklyn, N. Y.
Triangle Package Machinery Co., 908 N. Spaulding Ave., Chicago 51, Ill.
Triangle Paper Bag Co., 1301 Madison, Covington, Ky.
Triangle Paper Bag Mfg. Co., 943 W. 6th St., Cincinnati, Ohio
Trilsch, Oscar Co., 150-25 18th Ave., Whitestone, N. Y.
Trio Metal Cap Co., 3021 West Carrol, Chicago, Ill.
Tri-State Plastic Molding Co., Henderson, Ky.
Trum, B. J., Inc., 70-84 Richards St., Bklyn, N. Y.
Tungsten Contact Mfg. Co., Inc., Cottage Ave. & 73rd Rd., N. Bergen, N. J.
Tupper Plastics, Farnumsville, Mass.
Turner White Metal Co., Inc., New Brunswick, N. J.
Tuttle Press Co., The, Appleton, Wis.
Twining Laboratories, The, 2527 Fresno St., Fresno, Calif.
Twitchell, E. W. Inc., Pkg. Div., Public Ledger Bldg., Phila., Pa.
Tygart Valley Glass Co., Washington, Pa.

U

Ullman Bag Co., 5205 Loraine Ave., Detroit 8, Mich.
Ullman, Martin, 459 So. Hamel Rd., Los Angeles, Calif.
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